A COMPARATIVE STUDY BETWEEN OPEN AND LAPAROSCOPIC CHOLECYSTECTOMY IN KAPV GOVT MEDICAL COLLEGE, TRICHY

Dissertation submitted to
The Tamil Nadu Dr. M.G.R.
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With fulfilment of the regulations
for the award of Degree

M.S. GENERAL SURGERY
BRANCH – I

DEPARTMENT OF SURGERY
K.A.P.V. GOVT. MEDICAL COLLEGE,
TRICHY.

APRIL 2014

CERTIFICATE

This is to certify that this dissertation titled "**A COMPARATIVE STUDY BETWEEN OPEN AND LAPAROSCOPIC CHOLECYSTECTOMY IN KAPV GOVT MEDICAL COLLEGE, TRICHY**" is a bonafide work of **Dr. INDRA PRIYADHARSINI. P.**., Post Graduate in M.S. General Surgery, Department of General Surgery, K.A.P.V. Government Medical College, Trichy and has been prepared by him under our guidance. This has been submitted in partial fulfilment of regulations of The Tamil Nadu Dr. M.G.R. Medical University, Chennai -32 for the award of M.S. Degree in General Surgery (Branch- I)

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DECLARATION

I **Dr. INDRA PRIYADHARSINI. P**, *solemnly declare that this dissertation titled,* **"A COMPARATIVE STUDY BETWEEN OPEN AND LAPAROSCOPIC CHOLECYSTECTOMY IN KAPV GOVT MEDICAL COLLEGE, TRICHY"** *is a bonafide work done by me at K.A.P.V. Government Medical College, during 2011-2014 under the guidance and supervision of my Unit Chief* ***Professor.*** **Dr. A.Kanaka Sundaram *M.S.***

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Place: Trichy

Date :

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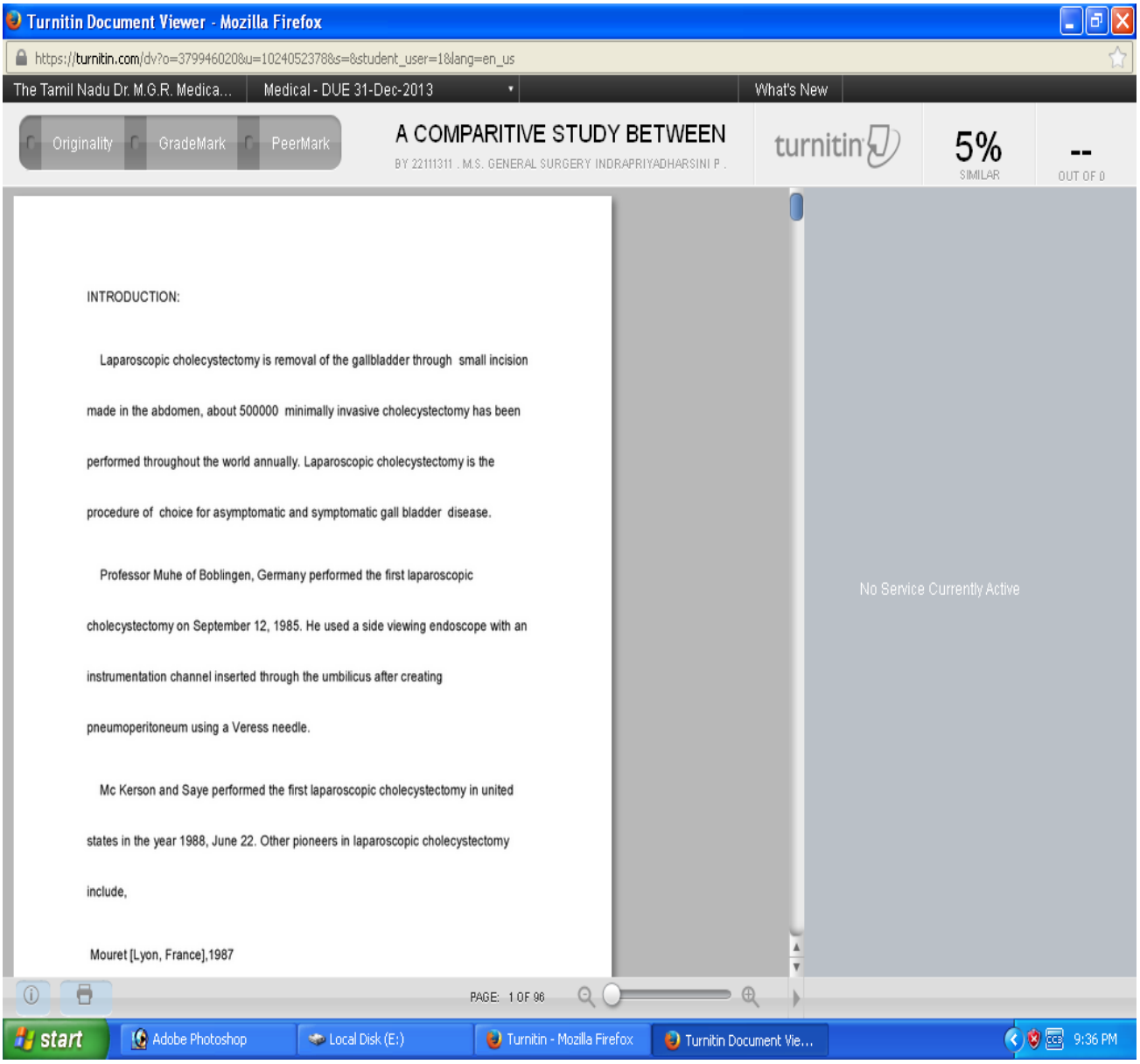
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Professor Muhe of Boblingen, Germany performed the first laparoscopic cholecystectomy on September 12, 1985. He used a side viewing endoscope with an instrumentation channel inserted through the umbilicus after creating pneumoperitoneum using a Veress needle.
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Dubios [Paris, France], 1988

Riddich[US],1988

Berci [Australia], 1988

Perissat [France], 1988

Cuschieri [UK], 1989

HISTORY OF OPEN CHOLECYSTECTOMY

The history of gall bladder surgery starts with Jean Louis Petit over 250 yrs ago(1674- 1750). He performed puncture and removal of the gall bladder stones. First choledocholithotomy was performed by Ludwig George Courvoisier(1890). First elective cholecystostomy was performed by John Stough Bobbs in Indianapolis for hydrops of gall bladder. Carl Langenbuch performed the first cholecystectomy in Berlin.

AIM OF THE STUDY

The aim of this study is to compare laparoscopic cholecystectomy with that of open cholecystectomy by the factors of

- technique of surgery,
- duration of surgery,
- post operative morbidity,
- analgesic requirement,
- antibiotic requirement,
- post operative hospital stay,
- complications,
- duration for normal diet,
- duration for return to normal activity
- cosmetic effect of laparoscopic surgery over open surgery.

REVIEW OF LITERATURE[1]

Gall bladder is a pear shaped organ in the fossa in the inferior surface of the right lobe of the liver. It is a reservoir of bile.It is 7-10 cm long and 3cm broad and capacity is about 30-50 ml. It has a fundus body and neck. The fundus projects beyond the inferior surface of the liver and related anteriorly to the anterior abdominal wall and posteriorly to the beginning of the transverse colon.

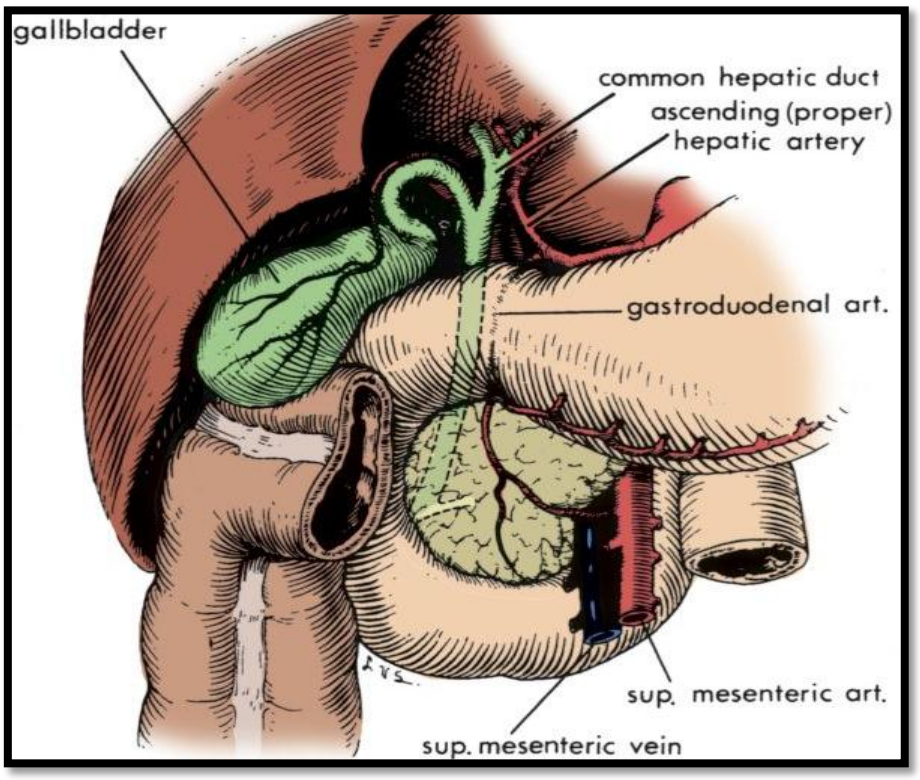
In the gall bladder fossa located the body of gall bladder. The neck is the narrowest part of the gall bladder and in the postero medial wall of the neck is dilated to form a pouch called the Hartmanns pouch. Some consider this pouch as a normal feature; others consider this as pathological and occur only in those with gall stones.

The cystic duct is about 3-4cm long and cystic duct joins the common hepatic duct and forms the common bile duct. The mucous membrane of the cystic duct forms a series of 5-12 cresentric folds called spiral valves of Heister.

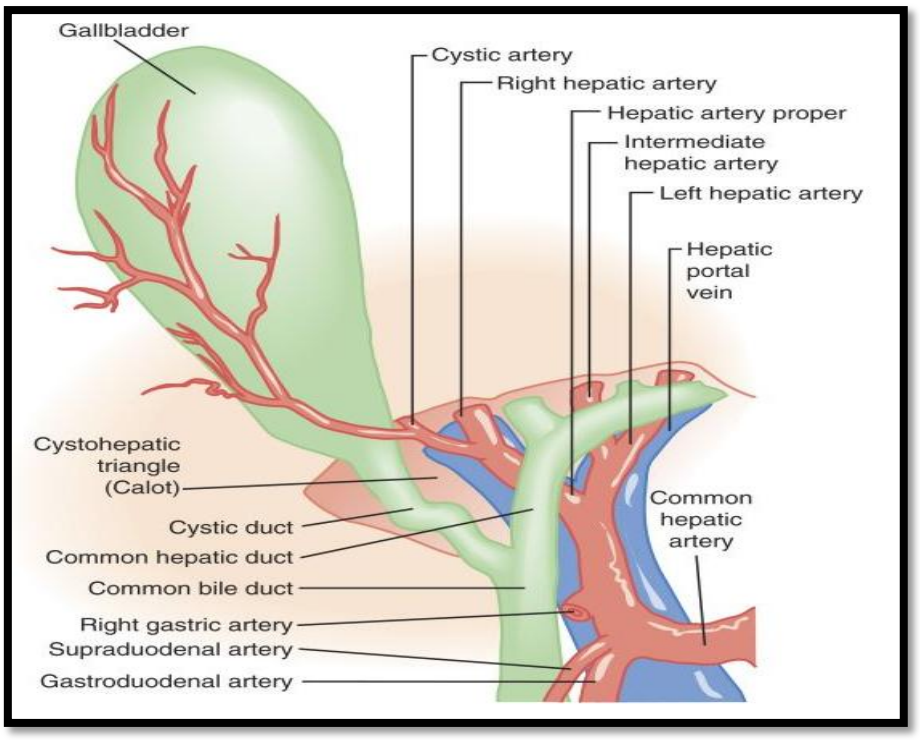
Blood supply of the gall bladder is cystic artery. It also supplies the cystic duct, hepatic duct and upper part of the bile duct. Cystic artery arises from the right hepatic artery, occasionally arises from the hepatic artery and rarely from the gastroduodenal artery.

Gall bladder drains into the cystic vein and superior surface drains into the liver. The lymphatic drainage is into the cystic node, located in the angle between the cystic and common hepatic duct.

Nerve supply is from the cystic plexus of nerves. Pain from the gall bladder passes along the vagus , sympathetic nerves T4-7 and through phrenic nerve. So pain may be referred to various sites such as through vagus to the stomach, sympathetic nerves to the inferior angle of the scapula, or through the phrenic nerve to the right shoulder.



Anatomy of gall bladder



Vascular supply

CALLOTS TRIANGLE

It is formed by the common hepatic duct on the left, the cystic duct on the right and the liver above. This triangle is of more surgical importance as it has the cystic artery as its contents. Dissection of this triangle and identifying the cystic duct and artery , isolating them without damage to the common bile duct is more important in cholecystectomy.

This triangle has a lymohnode called the cystic lymphnode. This gets enlarged in cases of infection and malignancy.

COMMON BILE DUCT

The common bile duct is formed by the cystic duct and common hepatic duct. It is about 8cm long and 6mm dm. It runs downwards and backwards and along the free border of the lesser omentum , supra duodenal part and then passes behind the duodenum 1st part called the retro duodenal part and then through the head of the pancreas called the infra duodenal part. Along the free border of the lesser omentum the common bile duct is related to the hepatic artery to the left and portal vein posteriorly. The common bile duct joins the pancreatic duct and enters the duodenum at the ampulla of Vater located in the medial wall of the second part of the duodenum.

ANAMOLIES OF THE GALL BLADDER

Absent gall bladder.

Phrygian cap.

Floating gall bladder.

Diverticulum of gall bladder.

Double gall bladder.

Septum in gall bladder.

The knowledge of anamolies are important while interpreting the imaging modality. The imaging modality helps in identifying the anamoly

prior to surgery and necessary precautions can be taken to avoid injury to adjacent structures.

ANAMOLIES OF THE CYSTIC DUCT

Cystic duct absent with wide communication with CBD

Long cystic duct joining CBD very low

Cystic duct joins the right hepatic duct

Accessory duct of Lushka- cholecysto hepatic duct

Double cystic duct

Segment IV drainage from liver to duct

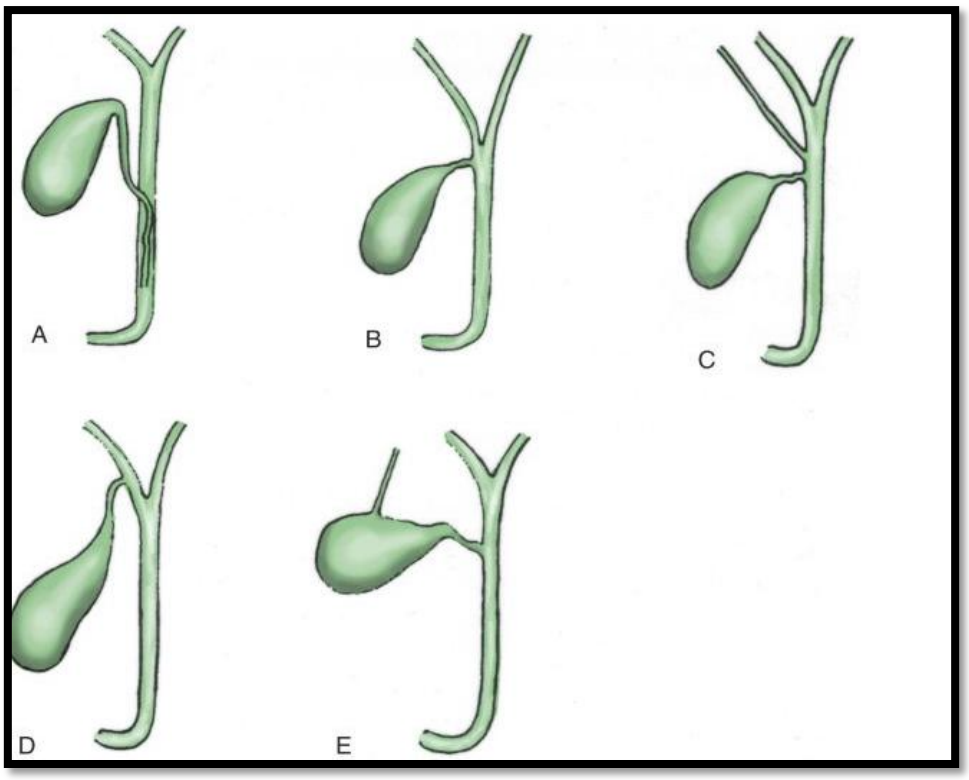
Right posterior sectorial duct into the neck of gall bladder

In case of wide communication with the CBD the differentiation between the common bile duct and the gall bladder becomes difficult and the common bile duct may get included while ligating the cystic duct. This leads to stricture of the common hepatic duct in future.

In cases of long cystic duct the difficulty is mainly due to the exposure of the end of the cystic duct joning the common bile duct.

In case of double cystic duct, both the duct should be identified and ligated separately to prevent the bile leak.

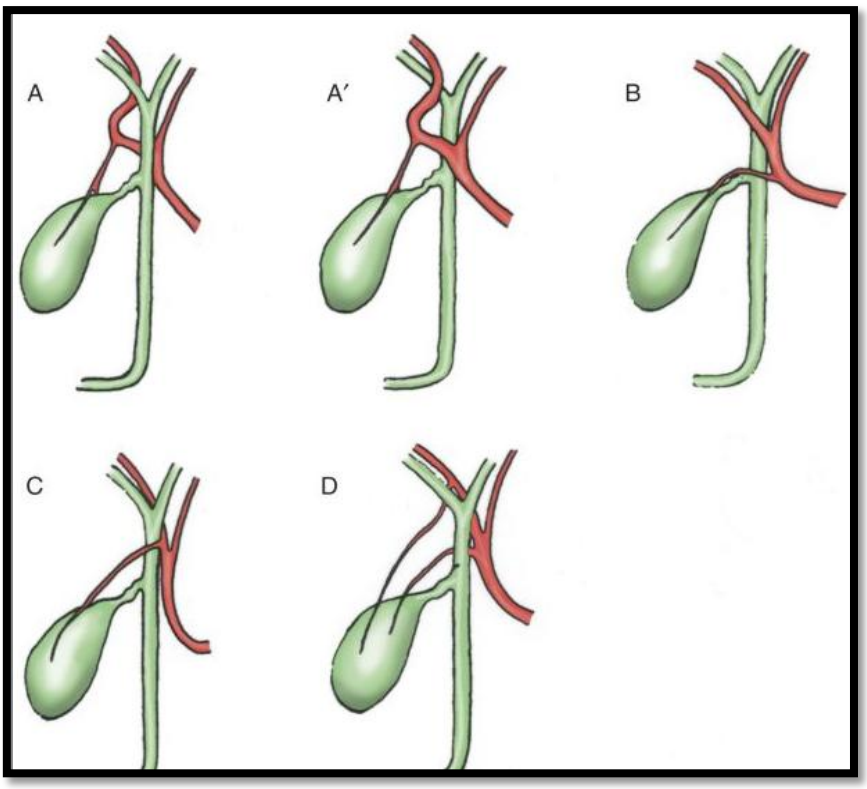
In case of accessory chole-cysto hepatic duct, failure to identify it and ligating leads to bile leak and bile peritonitis.



ANAMOLIES OF CYSTIC ARTERY

1) Accessory cystic artery arises from the hepatic artery or the gastro duodenal artery.
2) Low origin of the cystic artery
3) Cystic duct may cross the common hepatic artery anteriorly
4) Right hepatic artery may run closer to the cystic duct and neck of the gall bladder
5) Moynihans caterpillar hump- it is a bend in the right hepatic artery infront of the cystic duct or run closer to it.

The knowledge of the anamolies of the cystic artery is important in avoiding bleeding during surgery and also care should be taken not to ligate the right hepatic artery instead of the cystic artery.



Anomalies of cystic artery

FUNCTIONS OF GALL BLADDER:[3]

- Gall bladder stores bile during the phase between digestion and gall bladder contracts and release bile into the duodenum through the ampulla of Vater when the food enters the duodenum.

- The daily secretion of bile from the liver is about 20 times the storage capacity of the gall bladder. The wall of gall bladder absorbs water and electrolytes from the bile and concentrates the bile 6-7 times. The bile that has secreted from the liver has a water content of about 97% and the water is absorbed by the mucosa of the gall bladder and the water content when excreted into the duodenum is 89%.
- The mucus membrane of the gall bladder secretes mucus and it gets added to the bile. The mucin makes the bile thick and viscous.
- The PH of the bile secreted by the liver is about 8.6. the mucosa absorbs the HCO3 and Na, Cl, ions from the bile and its PH is dropped to 7.4.
- Gall bladder regulates the pressure within the biliary system and when the cystic duct and the CBD is clamped together the pressure within the biliary tree rises to about 30 mmHg in an hour but when only CBD is clamped it leads to only 10 mmHg increase in pressure. This shows the gall bladder plays a role in regularising the normal pressure within the biliary tract by absorbing water.

GALL STONES[4,5,6,7,]

Gall stones are the commonest biliary pathology. In USA prevalence is 10- 15% of their adult population and in UK it accounts for about 17% in India. Prevalence is more in North India compared to South India.

About 80% of the stones are asymptomatic and about 1-2% of these asymptomatic patients develop symptoms in a year.

Gall stones are more common on fatty, forty, fertile female with flatulence. These female have mostly asymptomatic gall stones. Some have mild discomfort. Obesity is the risk factor in such patients in whom the cholesterol level is higher, which predisposes to the development of gall stones.

Three types of gall stones are

cholesterol

pigment

mixed

CHOLESTEROL STONES AND MIXED STONES

Cholesterol stones are rare and it accounts for only 10% of the total gall stones. Pure cholesterol stones have a smooth surface and large stones.

The mixed stones have 70% cholesterol and remaining made of calcium and bile pigment. They look like mulberry shaped, irregular rough surface and hard to feel. The mixed gall stones look yellow, green or sometimes black in colour. The stones that contain calcium are radioopaque. The pure cholesterol stones are radiolucent.

The gall stone formation is initiated by the bilesalts and lecithin. Lecithin is a phospholipid which helps in the process of dissolving cholesterol in bile. When more amount of cholesterol is secreted and which couldnot be adequately dissolves by the existing bile salts and lecithin leads to presence of insoluble cholesterol in the bile. This is called the supersaturation of bile.

The cholesterol is secreted as vesicles which contain the complex of cholesterol and phospholipid. Then this vesicle gets conjugated with the bile salt and forms a complex called the cholesterol- phospholipid-conjugated bile salt and this helps the cholesterol to be in soluble state in the bile. This complex is called micelles.

When the vesicles become rich in cholesterol this complex becomes unstable and leads to formation of crystals of cholesterol.

PIGMENT STONES

Conjugated bile salts are soluble in bile and donot gets precipitated, but deconjugated is conjugated bilirubin precipitates with calcium and forms calcium bilirubinate. In normal person conjugated bilirubin is secreted in smaller amount but in case of diseased liver unconjugated bilirubn is produced more and it gets precipitated with the calcium salts and forms calcium bilirubinate and also stimulates formation of calcium carbonate and calcium phosphate. They look like brittle, black, small, speculated stones.

In case of infection with E- coli ,the bacteria produces an enzyme called beta glucuronidase which causes enzymatic deconjugation and leads to accumulation of unconjugated bilirubin and the dead bacterial cell bodies acts as a nidus for stone formation. The salts of calcium deposits around the bacterial cell bodies. The stones are brown in colour.

In cases of sickle cell disease, hereditary spherocytosis and other haemolytic disorders there is increase in the production of the unconjugated bilirubin and leads to deposition of calcium salts and formation of pigment type of gall stones.

The pigment stones are the most common type of stones. They have less than 20% of cholesterol in them.

FACTORS ASSOSIATED WITH FORMATION OF GALL STONES

supersaturation of bile with cholesterol

decrease in bile acids

obesity

high calorie diet

sickle cell anaemia

haemolytic diseases

infected bile

NATURAL HISTORY OF GALL STONES

Most patients with gall stones are asymptomatic throughout their life. Only 2% of the patients among them develop biliary symptoms such as biliary colic. Biliary colic is because of the obstruction caused by the gall stone at the cystic duct which leads to a colicky pain in the right hypochondrium and presents like acute abdomen.

About 0.2% of the asymptomatic patient progresses to acute cholecystitis in a year. This most commonly occurs in patients with diabetes mellitus.

The gall stones may pass through the cystic duct and causes obstruction of the common bile duct and leads to obstructive jaundice. It also causes cholangitis i.e; inflammation of the common bile duct. The sludge present in the gall bladder may regurgitate into the pancreatic duct which causes pancreatitis.

Some of the patient progresses to recurrent attacks of cholecystitis and the gall bladder becomes contracted and functions are diminished.

About 2/3 of the patients with gall stones donot develop symptoms during their life time.

CLINICAL PRESENTATION

1) Right upper quadrant pain
2) Epigastric pain radiating to back
3) Dyspepsia
4) Flatulence
5) Food intolerance
6) Biliary tree

COMPLICATIONS OF GALL STONES

IN GALL BLADDER

1) Acute cholecystitis
2) **B**iliary colic
3) Chronic cholecystitis

4) Empyema
5) Perforation of gall bladder
6) Mucocele of gall bladder

IN BILE DUCT

1) Cholangitis
2) Biliary obstruction
3) Acute pancreatitis

IN INTESTINE

1) Gall stone ileus

Now-a-days there is no indication to do cholecystectomy in a asymptomatic patient except[5]

1) Calcification of gall bladder.
2) Diabetes mellitus.
3) Patient undergoing surgery for some other abdominal conditions when general condition is good.
4) Patient on treatment for acromegaly with somatostatin.

In our study we consider

1) Acute cholecystitis
2) Cholelithiasis
3) Chronic calculus cholecystitis
4) Biliary colic

INDICATIONS FOR OPEN CHOLECYSTECTOMY:[6,7]

Calculus cholecystitis

Carcinoma gall bladder

Acute cholecystitis

Chronic cholecystitis

Biliary colic

Perforation of gall bladder

Empyema of gall bladder

Polyp of gall bladder

Cholecysto enteric fistula

Mucocele of gall bladder

Emphysematous cholecystitis

INVESTIGATIONS:[4,5,6,7]

1) COMPLETE BLOOD COUNT

Total count will be increased in case of inflammation such as cholangitis, acute cholecystitis, empyema, emphysematous cholecystitis.

Erythrocyte sedimentation rate will be increased in inflammatory conditions.

2) RENAL FUNCTION TEST

3) BLOOD GROUPING

4) LIVER FUNCTION TEST

1)Bilirubin- direct, indirect

Identified by Van den bergs test.

Normal value of bilirubin is <1mg%

Conjugated bilirubin is increased in cases of obstructive jaundice.

Bilirubin gets elevated in cases of stone in the Common bile duct causing obstruction or may be due to cholangitis.

In case of obstruction the bilirubin level will be progressing and in case of cholangitis there is intermittent increase in bilirubin concentration.

2)SGOT – Aspartate amino transaminase

-5-40 IU/l

- increased in inflammation of biliary tree and liver

3)SGPT – Alanine transaminase

- 5-40 IU/l

- this is specific for liver pathology

4) Alkaline phosphatise

- 35-130 IU/l

5) Gamma glutamyl transpeptidase

6) Prothrombin time

Production of prothrombin and storage of vitamin K is diminished in cases of obstructive jaundice so prothrombin time gets prolonged. Normal value is 12-16 seconds. When it is increased to about one and a half times the normal control value or four greater than the control is considered as abnormal.

This should be treated with vitamin K injection BD for five days, or transfusion of freshly frozen plasma. About 5-8 units of fresh frozen plasma is needed to correct the abnormality.

7) Albumin

Albumin production occurs in the liver. In cases of obstruction there is diminished production and so the albumin globulin ratio gets reversed. The normal value is 3.5.

5) URINE ANALYSIS

a) URINE BILE SALTS

Bile salts are identified by Hays method. To about 2ml of fresh urine sulphur powder is sprinkled and if bile salts are present it acts as a surfactant and so the bile salts sink to the bottom. If bile salts are absent then the bile salts float.

b) URINE BILE PIGMENTS

Bile pigments are identified by the Fouchets test. 5ml of barium chloride and a pinch of magnesium sulphate is added to about 10 ml of fresh urine and filtered over the filter paper. The precipitate of barium sulphate gets filtered over the filter paper and 5ml of fouchets reagent is added to the paper and it becomes blue or green in the presence of bile pigments in the urine. No colour is formed if bile pigments are absent in the urine

c) URINE URO-BILINOGEN

Urobilinogen in urine is identified by the Erhlich test.

p-dimethyl amino benzaldehyde is called the Erhlich reagent.

1 ml of Erhlich reagent is added to about 10 ml of freshly voided urine and wait for 5 minutes, if it becomes red in colour if urobilinigen is present in the urine.

Only traces of urobilinogen is present in the urine normally. In case of obstructive jaundice it will be absent and in case of haemolytic jaundice more amount of urobilinogen will be present in the urine.

6) PLAIN X-RAY ABDOMEN

Plain X ray abdomen is useful to diagnose only radio opaque stones. Most of the gall stones are radiolucent as they have cholesterol. Only stones made of calcium bilirubinate or phosphate appears radioopaque. Air can be detected in the gall bladder in case of gangrene of the gall bladder.

The gall stones present as a radio opaque shadow right to the vertebra just below the right costal border in an antero-posterior view. It has to be differentiated from the renal stone. When a lateral view is taken the gall stone shadow will appear anterior to the vertebral shadow.

The radio lucent stones may have air in-between the crevices which appear in a plain X-ray abdomen like the foot of a crow. It is called the crow foot sign or Mercedes Benz sign. This sign appears in multiple gall bladder calculi only.

Air will be seen in the wall of the gall bladder in case of emphysematous cholecystitis.

Calcification of gall bladder wall – appears in case of porcelain gall bladder. There is diffuse deposition of calcium in the wall of the gall bladder. This condition is a sequelae of chronic cholecystitis. It may turn

to be malignant. Due to the risk of malignancy it should be removed by surgery either open or laparoscopic cholecystectomy.

Limely gallbladder appears radioopaque in a plain X-ray. The gall bladder contains calcium carbonate and calcium phosphate mixture which resembles the tooth paste and appears densely radio opaque. This should be treated by laparoscopic or open cholecystectomy.

7) ULTRA SONOGRAM ABDOMEN

- It is a standard investigation of choice for gall stone disease.
- It is useful to identify the calculi within the gall bladder, size of the gall bladder, pericystic fluid collection, thickness of the wall of the gall bladder and size of the common bile duct , calculi within the duct, dilatation of the common bile duct and intrahepatic biliary radicals dilatation.
- It is the cheapest and accurate modality of investigation for diagnosis.
- The disadvantages are mostly interference of bowel shadow, and difficulty in obese abdomen.
- It is highly dependent on the operator.
- Endoscopic ultra sonogram – this is done by passing a transducer through the mouth into the stomach and duodenum and the biliary system is scanned. This gives more accurate details about the

biliary stones, infiltration of common bile duct wall in case of carcinoma and identifies the periampullary carcinoma.

- The disadvantage of this is costly, availability , learning curve and operator dependent.

8)RADIO- ISOTOPE SCANNING

- Tc 99 labelled Hippuran imino di acetic acid- HIDA scan
- This radio labelled isotope is injected intravenously and wait for 30 minutes and take a picture.
- In normal individuals the retroendothelial cells of the liver absorbs the radio isotope and it is excreted into the bile and the gall bladder. So the entire biliary tree can be visualised.
- In case of acute cholecystitis gall bladder will not be visualised . in such cases wait upto 1 hr to confirm the diagnosis. In case of chronic cholecystitis, the gall bladder will be contracted due to chronic inflammation.
- Radio isotope scintigraphy is used to identify and quantify the leak in the biliary tree, so it more useful for the surgeon to decide about the further plan of treatment whether to operate again or can be treated conservatively.

9) CT SCAN ABDOMEN

- More useful in malignancy to find out the depth of invasion.
- In case of gall stones most of the stones are missed in CT and most commonly acute cholecystitis cannot be diagnosed by CT scan.
- The helical CT with reconstruction picture can be useful to diagnose the biliary tract pathology.
- So CT scan is not the primary modality of investigation for benign disorders of the biliary tract.

10) MRCP

- Magnetic Resonance Cholangio Pancreatography
- This imaging modality is dependent on the nuclear resonance imaging.
- This provides a detail imaging without the need for contrast.
- The biliary tract is well visualised.
- This is the investigation of choice for biliary tree diseases such as stricture, atresia, ductal stones and choledochal cyst.
- This imaging modality provides the advantages of both ERCP and percutaneous cholangio pancreatography without complications.
- The only disadvantage is that it cannot be used in case of patients having pacemaker.

11) ERCP

- This investigation is both therapeutic and diagnostic.
- Through a side viewing endoscope the ampulla of Vater is cannulated and the bile can be taken for culture sensitivity and cytology. Then the dye is injected into the biliary tree and imaging is done. This is useful for imaging strictures and ductal stones causing obstruction.
- This is also used for therapeutic procedure such as stone removal using the Dormia basket, placement of stent to relieve obstruction.
- The disadvantage of ERCP is pancreatitis. It should not be done in the presence of pancreatitis as it aggravates the condition.

12)PERCUTANEOUS TRANSHEPATIC CHOLANGIOGRAPHY

- This is more commonly used in case of patients with obstruction in the biliary tract which cannot be accessible to the ERCP.
- The okuda needle is inserted in the 8 the intercostals space into the liver in the midaxillary line.
- This should be done under antibiotic coverage and correction of the coagulation profile.
- Bile should be aspirated and sent for analysis.

- ❖ Then dye is injected and images are taken and the site of obstruction is diagnosed.
- ❖ The track is then dilated and stent can be placed into the biliary tract into the common hepatic duct.
- ❖ PTC can also be used for external drainage.
- ❖ This is more useful in cases of klatskin tumour or high located strictures.

The complications are

- Infection
- Bleeding
- Bile leak
- Perforation of CBD
- Bile peritonitis

The modality of the investigation should be decided according to the patient and the suspected pathology. The investigation should be selected appropriate for the patient.

INDICATIONS FOR OPEN CHOLECYSTECTOMY

1) Severe acute cholecystitis

2) Gall bladder perforation.

3) Carcinoma gall bladder

4) Conversion from laparoscopic procedure

5) Cholecystoentric fistula

6) Empyema of gall bladder

7) COPD complicating cholecystitis

8) Emphysematous cholecystitis

9) Cirrhosis complicating cholecystitis

10) Portal hypertension complicating cholecystitis

11) Cholecystitis in pregnancy- first trimester

12) Previous upper abdomen surgery with cholecystitis

OPEN SURGICAL PROCEDURE:[8,9,10]

ANAESTHESIA

General Anaesthesia

Epidural/ spinal Anaesthesia

INCISION:

Kocher's incision

Right paramedian incision

Right upper transverse incision

Mayo Robsons hockey stick incision

Upper midline incision

Mini laparotomy

Any one of the above said incision can be used. In our study we used Kocher's incision.

Kocher's incision is made a finger breadth below the right costal margin.

PROCEDURE:[9]

The first step is to free any adhesion between the omentum and the gall bladder. Careful packing is needed for proper visualisation of the field. A gauze roll is placed and the duodenum is retracted downwards, next gauze roll to displace the stomach from the field. The two principle methods of gall bladder removal are

1) Retro grade or duct first method

2) Fundus first method

The most commonly used method is the duct first or the conventional method.

DUCT FIRST METHOD

- This method involves dissection and dividing the cystic artery first and then gall bladder is dissected out from the liver bed towards fundus.
- When the gall bladder is over distended contents can be aspirated and aspiration site can be closed with a suture.

- Then sponge holding forceps is applied to the neck of gall bladder and retracted forwards.
- The peritoneum over the Callots triangle is dissected and structures identified. Cystic artery is ligated and cut.
- The cystic duct is identified and ligated close to the junction with the common bile duct and net ligature is placed close to the Hartmanns pouch and divided in between the sutures.
- Then the gall bladder is dissected out from the bed of liver. The early dissection of important structures decreases the risk of damage to the common bile duct and the right hepatic artery.

FUNDUS FIRST METHOD

- When severe inflammatory changes are present in the Callots triangle and when approach to the callots triangle becomes difficult this method is used.
- The gall bladder is removed from the liver bed starting from the fundus and the cystic artery and cystic duct ligated and gall bladder should be removed.
- The dangers encountered in this method are increased bleeding compared to the duct first method and chances of inclusion of the common hepatic duct in the ligature.

COMPLICATIONS

Haemorrhage

Injury to CBD

Injury to Common Hepatic duct

Paralytic ileus

Bile stasis

Intra- abdominal abscess

Venous thrombosis

Portal pyemia

Post cholecystectomy syndrome

Bile fistula

Intestinal obstruction due to adhesion

Pulmonary insufficiency

LAPAROSCOPIC CHOLECYSTECTOMY

EQUIPMENTS:[14]

Camera unit

Video monitor

Light source

Light transmission fibre optic cable

Insufflators

-CO_2/ nitrous oxide

-10-12 mm Hg

-4-12 lit/min flow rate

Suction irrigation apparatus.

Telescope- 0 degree, 30 degree, 45 degree.

CAMERA UNIT

The end of the telescope has a high definition eyepiece which takes image and transmits it through the fibre-optic cable to the monitor. The image is converted into the digital form in ones and zeros and in the computer it is processed into an image and displayed continuously in a monitor as a video. The whole unit is reusable and should be sterilised with glutyraldehyde. Occasional fogging of the camera occurs in the peritoneal cavity, then the lens should be cleaned with beta dine and hot saline.

LIGHT SOURCE

Light source of about 150-200 watts are used for illumination of the peritoneal cavity. Mercury, xenon, or halogen vapour is used.

Blood has the property of absorbing the light and so illumination will be reduced if there is more bleeding. In procedures where more bleeding is expected we have to increase the amount of brightness of light.

In obese patients the light may be insufficient for illumination of the peritoneal cavity. So in bariatric procedures the light source should be kept brighter than usual.

The fibre optic cable transmits the light source through the laparoscope.

TELESCOPE

The telescopes are of various sizes of length 24 cm. The telescopes are available in 10mm, 5mm, 3mm, 1.1 mm sizes. In adult patient telescope of size 11mm is used because the light may not be adequate for illumination of the peritoneal cavity. Smaller size telescopes are useful for paediatric age group.

5mm used in older children and 3mm useful in smaller children.

The telescope have a line of lenses made of quartz and this transmits the image throughout the length and the camera which is connected to the top of the telescope captures the images and transmit it to the monitor.

The end of the telescope are angled in three degrees

0 degree

30 degree

45 degree

Zero degree provides a straight view of about 76 degree.

30 degree provides a view of 152 degree.

45 degree telescope provides a view of superior and angled view posterior to the structure.

INSTRUMENTS

1) Trocars

- Bladed
- Non bladed safety trocars – the safety trocar have blunt tip which do not penetrate the hollow viscus or vessel.
- Optical trocars- the optical trocars have a transparent tip and the telescope can be inserted through it and the layers of the abdominal wall can be viewed directly and trocar can be placed safely under vision.

  It requires the experience of the surgeon to place the trocar correctly.

2) Cannulas

3) Veress needle – to create pneumoperitoneum,

4) 1 toothed grasper

5) 2 atraumatic grasper

6) 1curved dissector

7) 1 clip applicator

8) Suitable clips

9) 1 dissection hook

10) 1 pair scissors

11) 1 suction irrigation cannula

Figure 1
Reusable

Figure 2
Disposable

Figure 3
Flat-blade

Figure 4
Flat-blade

Unique Trocars

Figure 5
Conical

Figure 6
Optical-blade

Non-bladed Trocars

Figure 7

Figure 8

Figure 9

INSUFFLATORS

The insufflators deliver CO2 into the peritoneal cavity from the high pressurised gas cylinder. This has a filter before entering the abdomen cavity which prevents the micro dust from the gas cylinder from entering the abdomen and also prevents the entry of gas from the abdominal cavity into the cylinder.

This regulates the flow at the standard rate and maintains the pressure constantly in the fixed amount. The gas is humidified before entering the peritoneal cavity.

The insufflator should be set at the pneumoperitoneum of pressure about 12-15 mmHg.

LAPAROSCOPIC INSTRUMENTS

Laparoscopic instruments differ from the open general surgical instruments. There are six types of instruments used in laparoscopic procedure

- Grasper
- Scissors
- Dissectors
- Needle holder
- Retractors- e.g. Nathenson s retractor
- Other instruments- cannulas used for irrigation and suctioning

Instruments for coagulation and cauterisation

Harmonic scalpel

Care should be taken and ensure proper insulation to avoid electrical damage to the abdominal contents.

Commonly used instruments in laparoscopic cholecystectomy.

1) FENESTRATED GRASPER

It has a opening at the tip of the instrument. It is used to grasp the fundus of the gall bladder and retract it towards the dome of the diaphragm.

It is also useful to hold the infundibulum and retract it.

2) MARYLAND DISSECTOR

This instrument has a sharp tip at the end of the instrument , it is similar to the artery forceps and in open general surgery and in laparoscopic cholecystectomy. It is used to dissect the Callots triangle and also the gall bladder from the liver bed.

3)ENDOCLIP APPLICATOR

The clip applicator is an instrument used to clip the cystic artery and the cystic duct. The tip of this instrument has two blades which hold the clip and when the lock is released the clip holds the cystic artery and the cystic duct.

4) CLIPS

Laparoscopic clips are of three types

Small

Medium

Large

Medium size clips are useful in laparoscopic cholecystectomy to clip the cystic duct. Small size clips are used to clip the cystic artery.

5) HOOK DISSECTOR

This instrument has an L shaped hook at the tip and it is used to dissect the loose areolar tissue with the help of the electric current and coagulate tissues.

6) SPATULA DISSECTOR

This dissector has a spatula shaped tip. This is used to retract the tissue and dissect the gall bladder from the liver bed.

7) TROCAR

-conventional trocar

- blunt tipped safety trocar

-optical trocar

Trocars can be reusable or disposable type.

8)VERESS NEEDLE

This needle is used to create pneumoperitoneum by closed method. A stab incision is made in the umbilicus with a 11 size blade and veress needle is inserted and CO2 is insufflated and pneumo peritoneum is created.

PNEUMOPERITONEUM

Gas is insufflate into the peritoneal cavity for laparoscopic surgery using an insufflator called the pneumoperitoneum. The gas commonly used is CO2, but helium, nitrous oxide and oxygen can be used. The advantages of CO2 compared to other gases are it is easily soluble in the blood and excreted through the lungs. It is non combustible so can be used with the electrical devices while operating on the patient.

When the trocar is introduced in to the peritoneal cavity the pressure is <5mm of mercury, if it is greater it means that the trocar is in the wrong way and in the muscular plane.

The normal intraabdominal pressure is about 5mm of Hg and in laparoscopic surgery it should be raised upto 15mm Hg and in pregnancy it should be less than 12mm Hg in the second trimester. Creating pneumoperitoneum in third trimester may induce premature labour.

EFFECTS OF PNEUMO PERITONEUM

RESPIRATORY SYSTEM

Pneumo peritoneum causes decrease in the functional residual capacity of the lungs

increase in the alveolar dead space.

increases the pulmonary vascular resistance.

leads to ventilation perfusion mismatch and leads to acidosis

respiratory failure.

CARDIOVASCULAR SYSTEM

Pneumoperitoneum causes increase in the intra abdominal pressure and there by compression of the IVC and reduction in the venous return.

Decrease in venous return leads to reduced cardiac output and thereby increases the heart rate

fall in blood pressure.

Hypercapnia induced by the CO2 leads to arrhythmias

Cardiac failure

Patients with pre-existing cardiac problems may go for cardiac failure more commonly when appropriate measures are taken.

RENAL SYSTEM

Reduced cardiac output and also increase in the intra abdominal pressure leads to reduction in the renal blood flow and decreases the GFR. The reduction in the GFR leads to the stimulation of the Renin Angiotensin Aldosterone system and causes increase in Blood pressure

and compensate the reduction in the renal blood flow. In patients with impaired renal function it leads to oliguria and renal failure.

OTHERS

CAPNOTHORAX – the cabon di-oxide that is used to insufflate the abdomen may enter the thorax and cause capno thorax. This most commonly occurs in the right side. There may be some pre-existing pleuroperitoneal fistula which is more common in the right side. The carbon di oxide may enter through the fistula and cause capnothorax.

The steps to be taken immediately for capnothorax are

Desufflate the abdomen

Evacuate the CO2 in the peritoneal cavity

Put the patient on positive end expiratory pressure.

Correct hypoxia

Evacuate the CO2 in the pleural cavity.

Put a soft rubber drain through the fistula and drain the CO2 directly outside and connect it to an under water seal and maintain it till all the air bubbles come out and lung gets expanded.

CO2 EMBOLISM - sometimes insignificant tiny air bubbles may be present in the heart during laparoscopic procedures. Significant air embolism occurs rarely. When CO2 embolism occurs there is sudden

unexplained hypotension and hypoxia, there will be sudden decrease in the end tidal volume of CO2.CO2 will be present in the right ventricle and blood is pushed against the blood CO2 interface and so Mill wheel murmur will be heard.[14]

The measures to be taken for CO2 embolism are

Stop the Co2.

Immediate deflation of abdomen.

Put the patient in left lateral decubitus position.

Put the patient in head end position so that the air bubble reaches the apex and does not interferes with the blood flow across the atrio- ventricular valve.

Adequate oxygenation should be provided.

ACIDOSIS

DVT – when the duration of surgery is expected to be greater than 90 minutes then prophylaxis for DVT should be given.

CONGESTIVE HEPATOMEGALY – this is due to decrease in the venous return to the heart, venous congestion of the liver occurs.

TRANSIENT ELEVATION OF LFT

ENERGY SOURCES:

1) Diathermy- unipolar/ bipolar
2) Endo coagulation
3) LASER
4) Hormonic scalpel
5) Ultrasonic dissector

Unipolar/ bipolar diathermy is most commonly used

INDICATION FOR LAPAROSCOPIC CHOLECYSTECTOMY:[12,13]

1) Symptomatic cholelithiasis
2) Acute cholecystitis
3) Acalculous cholecystitis
4) Gall bladder pancreatitis
5) Gall bladder polyps
6) Asymptomatic cholelithiasis

    Diabetic patients

    Acromegaly

    Renal transplant

    Immune compromised

    Calcified gall bladder

Patient on TPN

Sickle cell disease

hereditary spherocytosis

Combined with other surgical procedure

CONTRA INDICATIONS:[12,13]

ABSOLUTE

Gall bladder carcinoma

Patient unfit for general anaesthesia

Portal hypertension

RELATIVE

Acute severe cholecystitis

Cirrhosis of liver

Multiple prior surgery

Acute pancreatitis

Pregnancy

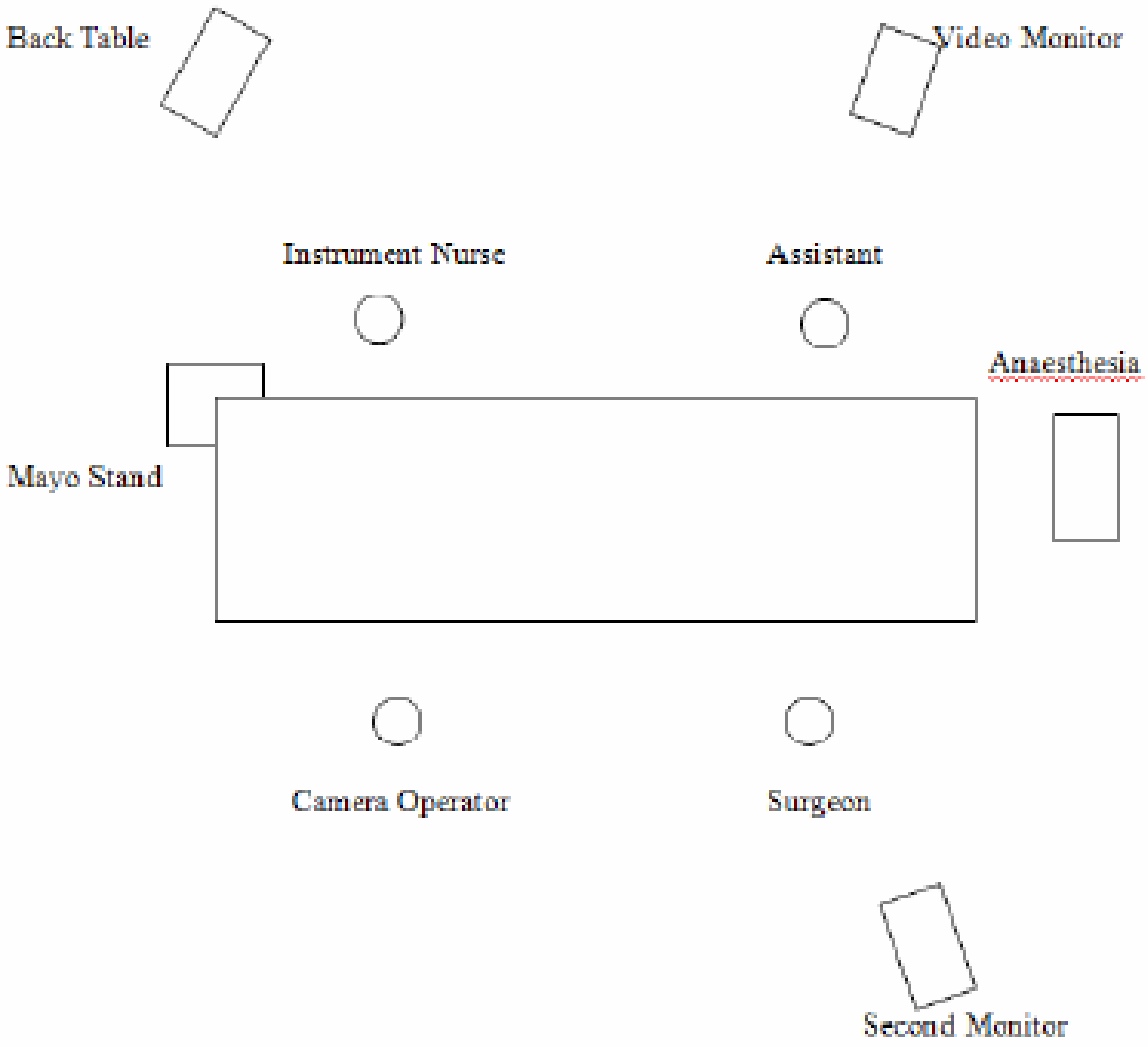
Abnormality in anatomy

Generalised peritonitis

Morbid obesity

Cholangitis with septic shock

ROOM SET UP



PREPARATION

Ryles tube aspiration

Bladder catheterisation

DVT prophylaxis

General anaesthesia

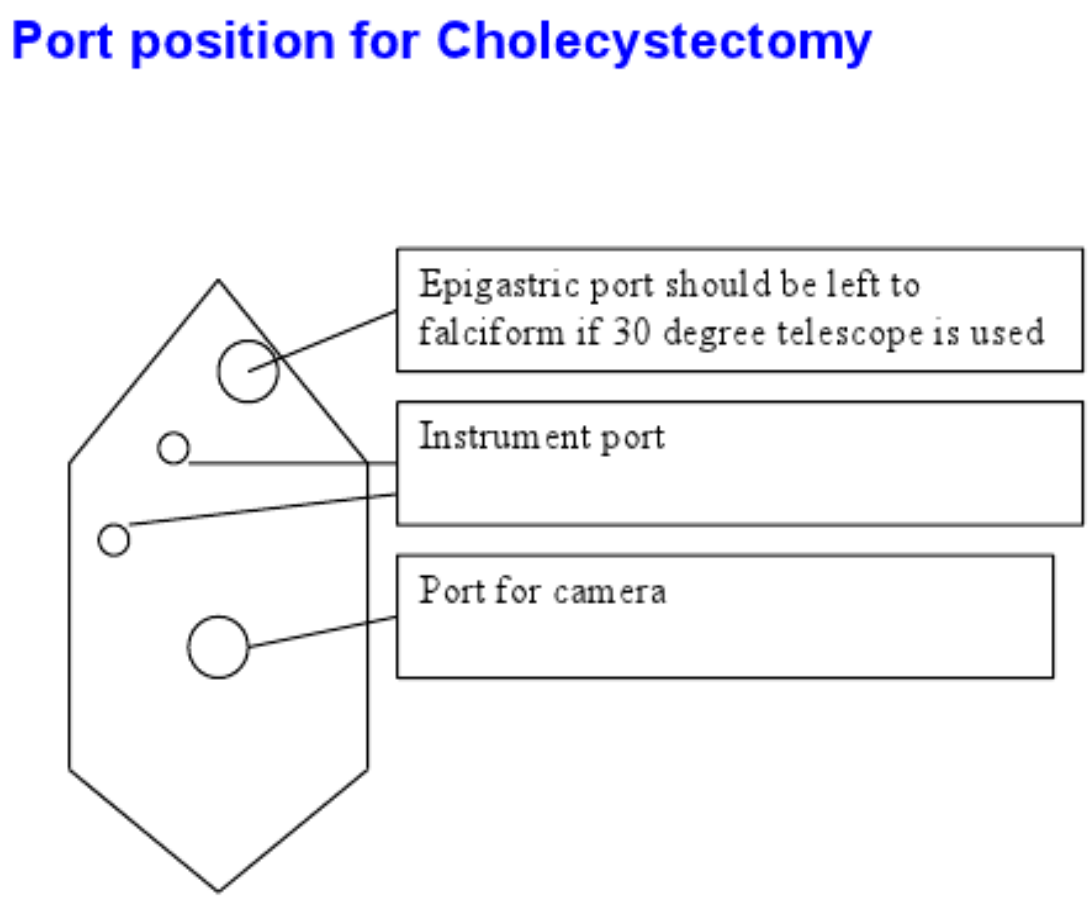
POSITIONING

North American positioning.

Two laparoscopic monitors on either side of patients trunk towards head end.

Surgeon stands left to the patient.

First assistant stands to the right an additional assistant can be asked to hold the laparoscope if available.



Port 1: umbilical port for camera 10mm.

Port 2: working port in epigastrium 10mm.

Port 3: 5mm port in the right subcostal region in the midclavicular line.

Port 4: 5mm port in the right anterior axillary line, for retraction of the gall bladder.

The 2nd, 3rd, 4th ports should be put under direct vision to avoid injury to the Underlying hollow viscus.

PROCEDURE:[12,13,15]

- Prepare the skin from the level of the nipple to the mid thigh and drape the operative field.
- Incise the skin in the inferior portion of the umbilicus and reach the anterior rectus sheath.
- Grasp the reflection of the linea alba with the Kocher's clamp and make an incision for about 1.2 cm in the linea alba longitudinally with 15 blade.
- U stitch should be taken on either side of the fascia after making incision.
- Grasp the peritoneum and elevate it with a pair of straight artery forceps and incise it and place a Hassens trocar in the abdominal cavity and inflate with CO2 upto 15mm Hg pressure.
- Another method of creating pneumo peritoneum is by using Veress needle.
- The position of the needle can be checked by the saline drop test. When a drop of saline is placed at the top of the veress needle , it

goes inside the peritoneum when the tip is in the peritoneum cavity or 5ml of saline is injected, if the tip is in the peritoneal cavity the saline cannot be aspirated back.

- Choose 30 degree laparoscope and white balance it. Introduce the laparoscope through the umbilical port.
- Then create the epigastric working port by making an incision of about 1.2cm and introduce the trocar under vision just right to the falciform ligament, so that it does not interferes with the vision.
- Then create the 5mm port in the right subcostal region in the midclavicular and anterior axillary line.
- Place the table in 20-30 degree head up position called the reverse Trendlenburg position, so that the bowel and colon fall away from the field.
- Place two 5mm grasper through the lateral ports.
- The lateral grasper is used to grasp the fundus at the gall bladder and hold it towards the dome of the diaphragm.
- The medial grasper is used to retract the gall bladder at the infundibulum caudolaterally. This straightens the cystic duct and if infundibulum is retracted cephalad then it becomes straight with the CBD and so the risk of injury to the CBD is higher.
- Release any adhesion if present between the gall bladder and the omentum using hook cautery and identify the cystic duct and the

cystic artery present in the Callots triangle and dissect out all the areolar tissue present around it.

- Incise the peritoneal reflection between the liver and the gall bladder medially and proceeds towards the fundus of the gall bladder. Repeat the same procedure in the lateral aspect also.
- Apply endoclip to the cystic artery and the cystic duct. Any aberrant vessel or the cystic duct arising from the liver bed and entering the gall bladder should be clipped and should not be cauterised.
- Remove the gall bladder through the epigastric port. Irrigate the gall bladder bed and suction and remove clots.
- Remove the ports under direct vision and finally Hassens trocar should be removed.
- The fascia should be closed at the umbilical port to avoid the port site hernia. All port should be injected with bupicvacine for post operative pain relief.

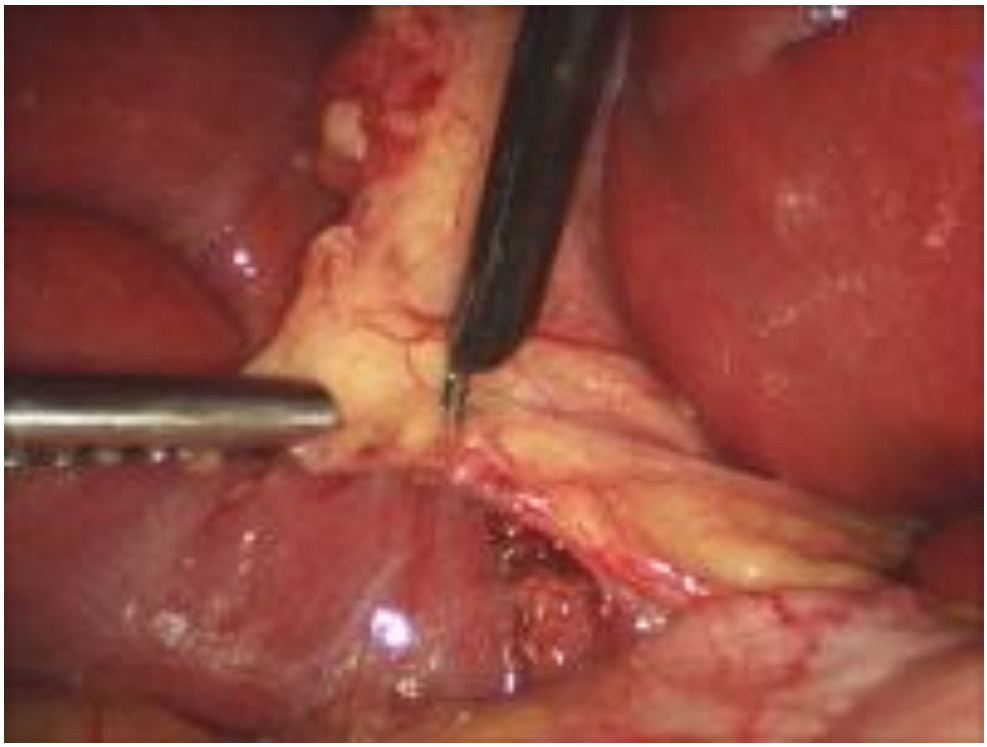
Visualisation of gall bladder

Placement of epigastric trocar under vision

Placemnt of 5mm ports under vision

Fundus retracted cephalad

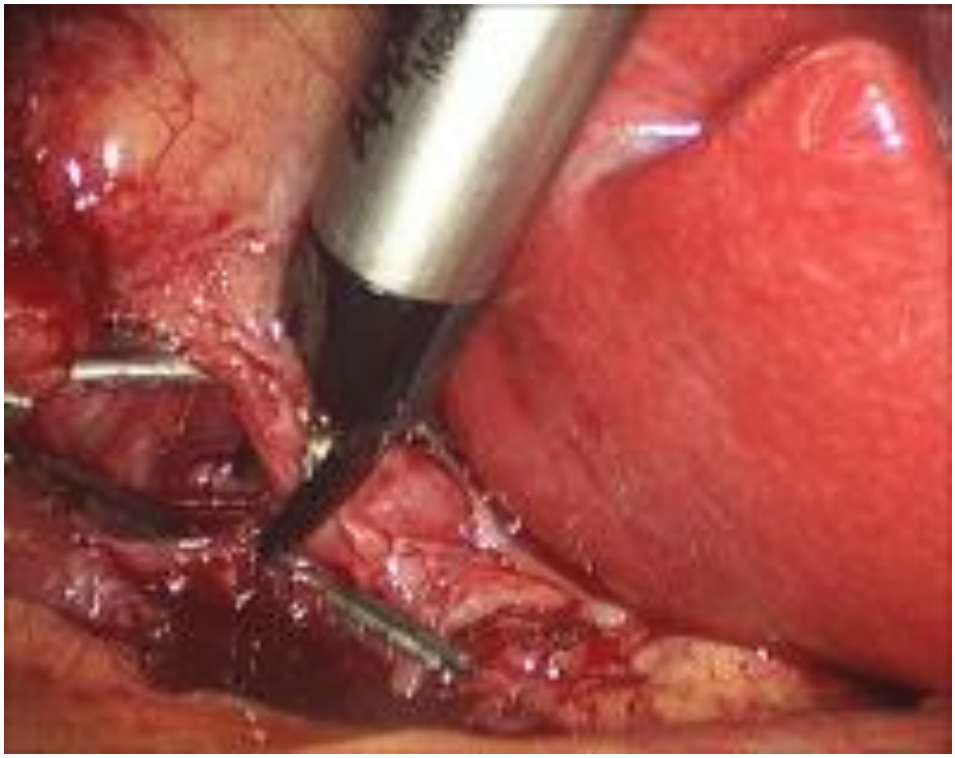
Infundibulum retracted caudolaterally



incising peritoneum medially

Dissecting cystic duct

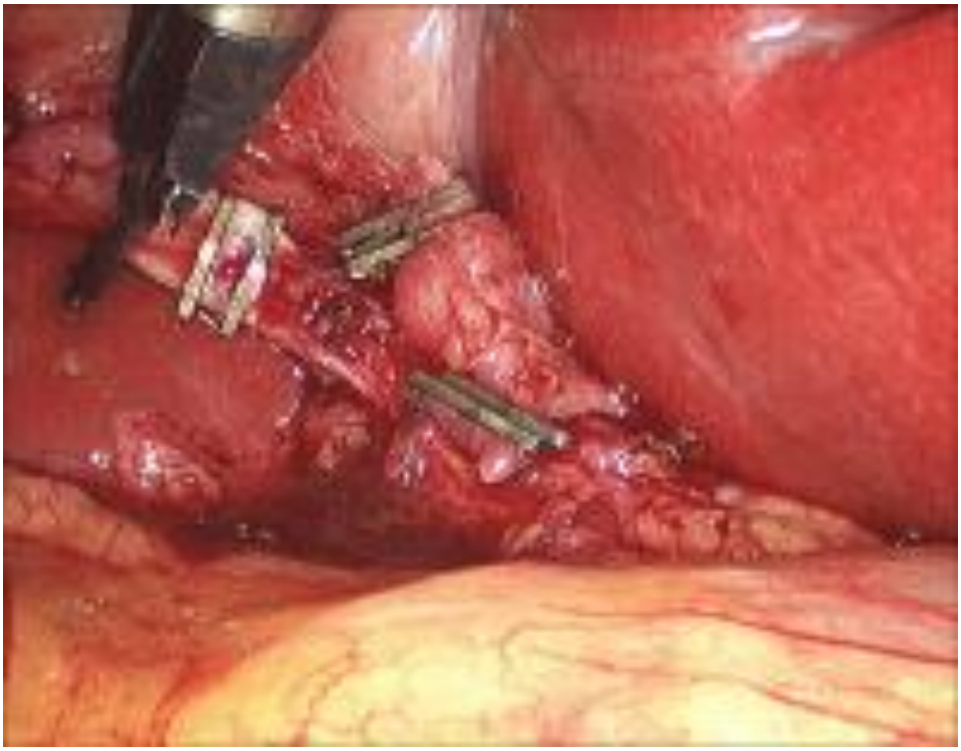
Clipping lower end of cystic artery



Clipping superior end of cystic artery

Clipping cystic duct distally

Clipping of cystic duct proximally



Transection of cystic duct

COMPLICATIONS OF CHOLECYSTECTOMY

- Haemorrhage may be from the

  -trocar site due to injury to the anterior abdominal wall muscles

  - due to injury to the omental vessels,

  - due to injury to the cystic artery or hepatic artery while dissecting the Callots triangle and from the gall bladder fossa.

  - from the liver bed.

The trocar site bleeding can be controlled by just compression or simple suturing full thickness and make another port or explore and ligate the bleeding vessel.

The omental bleeding can be controlled by ligating with a suture or by cauterisation.

Cystic artery bleeding should be arrested by clipping it with care not to damage the nearby vital structures in an anxiety to arrest the bleeding.

Blood may ooze from the liver bed, this can be arrested by cauterisation and drain should be kept in the bed.

- Perforation of the gall bladder and peritoneal cavity contamination with infected bile and gall stones.
- Spillage of stones – occasionally while performing laparoscopic cholecystectomy the gall stones may spill into the peritoneal cavity because of perforation of the gall bladder wall during dissection from the bile duct. Perforation occurs most commonly when the gall bladder is grossly distended. Care should be taken to decompress it to avoid spilling. If spilling of stones occur then remove the stones, if unable to remove the stones then there is no necessity to convert it into open method to remove the stones upto 30% cases spillage may occur.

  The complications that may occur due to spillage of stones are

  - Abscess
  - Fistula between the abscess and the abdominal wall.
  - Perforation of hollow viscus

- Injury to the common bile duct.

  When more traction is given to the infundibulum caudo laterally the cystic duct comes in line with the common bile duct and the common bile duct will get included in the clip applied to the cystic duct.

  While dissecting in the Callots triangle there is chance for full thickness injury to the bile duct with the cautery. This leads to post operative bile leak and bile peritonitis

- Perforation of hollow viscus during trocar insertion. Small bowel most commonly gets injured. Many times this perforation will not be evident intraoperatively, manifests most commonly post operatively as faecal peritonitis and mortality is high in such cases. If bowel perforation is identified intraoperatively then the procedure should be converted into open and bowel suturing should be done.

- Carcinoma of gall bladder may be missed during laparoscopic cholecystectomy.

POST OPERATIVE COMPLICATIONS

1)Bile leak - the bile leak occurs through the cystic duct or due to injury to the CBD with cautery.

- When the endoclip is not tightly holding the cystic duct, it leads to leak through the end.
- When cautery is applied to cut the cystic artery between ligature or dissecting the Callots triangle it causes thermal injury to the CBD, if it causes full thickness injury, the CBD wall goes for necrosis and perforation leading to leak.
- Most commonly leak stops spontaneously by 5 the post operative day.

The measures to be taken for bile leak are

- Laparotomy and place a T tube in the CBD and remove after epithelialisation and maturation of the CBD.
- ERCP can be done and stent can be placed. The stent can be removed later after CBD epithelialisation.
- For CBD laceration perform choledochojejunostomy or choledocho-duodenostomy.

Bile peritonitis – laparotomy should be done thorough wash should be given and T tube should be kept in the CBD .

Injury to hollow viscus and faecal peritonitis – laparotomy should be done and perforation should be closed .

Port site hernia through the 10mm port- if the rectus sheath is not closed hernia may occur through the port site. The incidence of port site hernia is about 0.56%. Hernia is rarely reported in 5mm ports. So any port size about 1cm or more should be closed with non absorbable suture material or using a suture passer.

Diathermy induced injury to bowel and liver.

Biliary strictures.

Port site metastasis in case of missed gall bladder carcinoma.

Retained stones – presence of stone in the common bile duct within 2 yrs of cholecystectomy is called the retained stones and that found after 2 yrs are called the recurrent stones. The stones may slip into the common bile duct while performing cholecystectomy or stone in the common bile duct may be missed during investigations. Such stones are called retained stones. The retained stones can be identified by ERCP and the

site of obstruction is confirmed and removal of stones can be done by Dormia basket. In case of impacted stone at the ampulla of Vater, if endoscopic removal fails, then transduodenal spinchteroplasty and removal of the stone is done.

RECENT ADVANCES

Abdomen wall lifting system

Harmonic scalpel

Electro thermal bipolar vessel sealer

SILS

Robotic surgery.

ABDOMEN WALL LIFTING SYSTEM

Pneumo -peritoneum is associated with detrimental effect to high risk patients with defective cardio-respiratory reserve. Mechanical abdominal wall lift is an alternative method in laparoscopic procedure to minimise adverse effects of pneumoperitoneum such as CO2 embolism and tumour dissemination in patients undergoing surgery for carcinoma. But abdomen wall lifting system reduces the exposure which makes the procedure difficult and increases the operating time. This can be overcome combining the abdominal wall lifting system with pneumo

peritoneum of low pressure 3-4mmHg. This provides good exposure and also reduces the complications of pneumoperitoneum.

Three types of such devices are there

T shaped instrument- invented by Gazayrli. This instrument can be inserted through the 10mm trocar port site and small portion of the anterior abdomen wall is lifted. This method is useful in patients who cannot tolerate 8mmHg.

U shaped- invented by Kiteno. When retractor is placed inside the abdomen, pneumoperitoneum can be evacuated and the procedure can be completed without insufflations.

Falciform device. In this , a long curved trocar of 4mm with flexible polyethylene tube is attached. It is inserted through a stab wound in the left upper quadrant and take it out through the right upper quadrant beneath the falciform ligament and lift the anterior abdominal wall.

ADVANTAGES

- No hypercapnia
- No air embolism
- No acidosis
- No respiratory compromise

DISADVANTAGES

- Limited exposure.
- Limited working space.
- Increased time consumption.
- Increase in port number.

HARMONIC SCALPEL

- The most commonly used cutting instrument used in laparoscopic instrument is monopolar and bipolar diathermy.
- The damage to the surrounding structure is more due to heat transfer to the surrounding tissue.
- To avoid such complication nowadays an instrument called harmonic scalpel is used.
- This instrument creates a vibration of 55500 Hz and this vibration creates friction and cause coagulation by production of heat.
- The vibration causes denaturation of proteins.
- The amount of heat transferred to the surrounding tissues is also less and also no current is passed through the patient.

ADVANTAGES

- No electric current passes through the patient
- Minimal damage to the surrounding vital structures
- More useful near vital structures
- Less damage to CBD

DISADVANTAGES

- Costly
- Availability

EBVS

- Electro thermal bipolar vessel sealing system
- The principle of this system is it has a electric current generator and a grasper.
- The blood vessel should be held with a grasper and electric current should be passed through it and it activates the electron and shift it to the next energy level and it produces heat.
- The heat generated denatures the protein in the vessel wall.
- The circuit breaks automatically when the impedance in the circuit increases beyond a certain level.
- The level of impedance is in control by the computer algorithm. Vessel upto 7mm can be successfully sealed with this instrument.

SILS

- Single incision laparoscopic surgery
- An incision of size about 2 cm is made in the inferior aspect of the umbilicus.
- The trocar with three holes are inserted through it.
- Then the flexible instruments are introduced through it and cholecystectomy is done in an usual manner.
- There is no significant difference in the recovery time between the conventional laparoscopic and SILS.

ADVANTAGES

- Multiple ports are not used.
- No scar visible.

DISADVANTAGES

- All instruments are positioned parallel to each other.
- Difficulty in handling instruments.
- Costly
- No significant extra benefits in terms of recovery post operatively.

ROBOTIC SURGERY

Robots are used in the surgery to help the surgeons and to overcome the disadvantages of the minimally invasive surgery. In this the surgeon operates through a telemanipulator or a computer assisted method.

The telemanipulator has an end effector arm which operate on the patient and the surgeon directly controls the telemanipulator. In the computer assisted method the surgeon controls the computer which in turn send signals to the end effector and the end effector operate on the patients. In this method the surgeon operates on the patient being anywhere remote in the world.

Robotic cholecystectomy was performed in Lindbergh in the year 2001, it was performed by computer aided remote method.

ADVANTAGES

The advantages of robotic surgery are

- Less blood loss
- Small incision
- Recovery is fast
- Precision
- Less pain

- Less tissue damage
- 3-D magnification
- Scar is minimal
- Hand tremor of surgeon is filtered out.

DISADVANTAGES

- Duration of surgery is long
- Duration of surgery is prolonged
- Costly
- Availability
- Learning curve

Operating from remote area becomes difficult when proper connection is lost.

MATERIALS AND METHODS

CASE SELECTION

In our KAPV Govt medical college hospital we are performing both laparoscopic and open cholecystectomy. This study is conducted between Jan 2012- Dec 2013.This study is a comparative study. I have selected 25 cases in laparoscopic cholecystectomy and 25 cases in open cholecystectomy and compared both. The indications are cholelithiasis, chronic calculous cholecystitis, biliary colic, acute cholecystitis and acalculous cholecystitis.

The factors taken into account are

Duration of procedure

Technique of procedure

Post operative pain

Requirement of analgesic

Requirement of post operative antibiotic

Complications – intra/post operative

Return to normal diet.

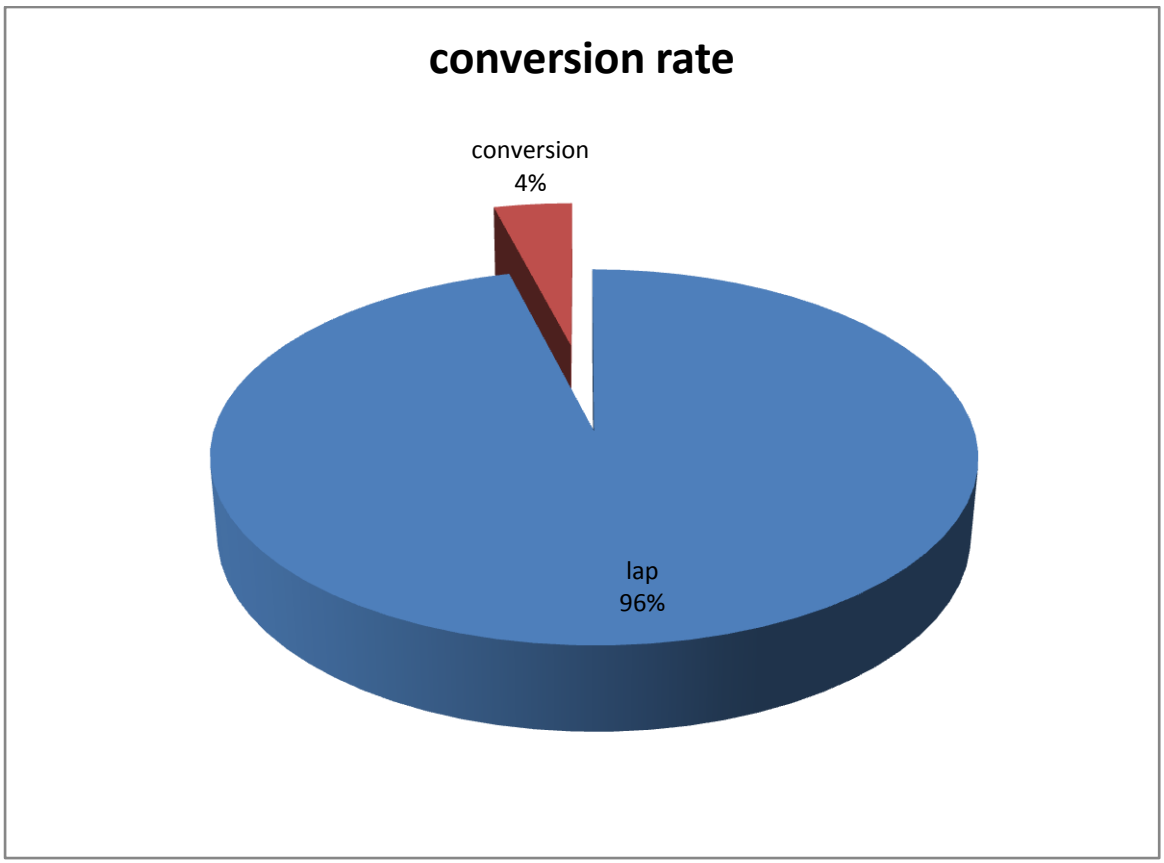
Post-operative stay in hospital.

Resumption of normal activity.

Cosmetic effect.

CONVERSION TO OPEN METHOD

Laparoscopy was converted to open in one case due to uncontrolled bleeding.



INDICATION FOR CONVERSION:[16]

- Adhesion
- Bleeding
- Severe inflammation
- Unclear anatomy
- Spillage of stones
- Impacted stones in the cystic duct.

- Mass in the gall bladder.
- Injury to the hollow viscus.
- Bowel adhesions

POST OPERATIVE ANALGESIC REQUIREMENT:

POSTOPERATIVE DAY	OPEN CHOLECYSTCTOMY	LAPAROSCOPIC CHOLECYSTECTOMY
I	25	25
II	25	25
III	6	25
IV	3	25
V	Nil	25
VI	Nil	25

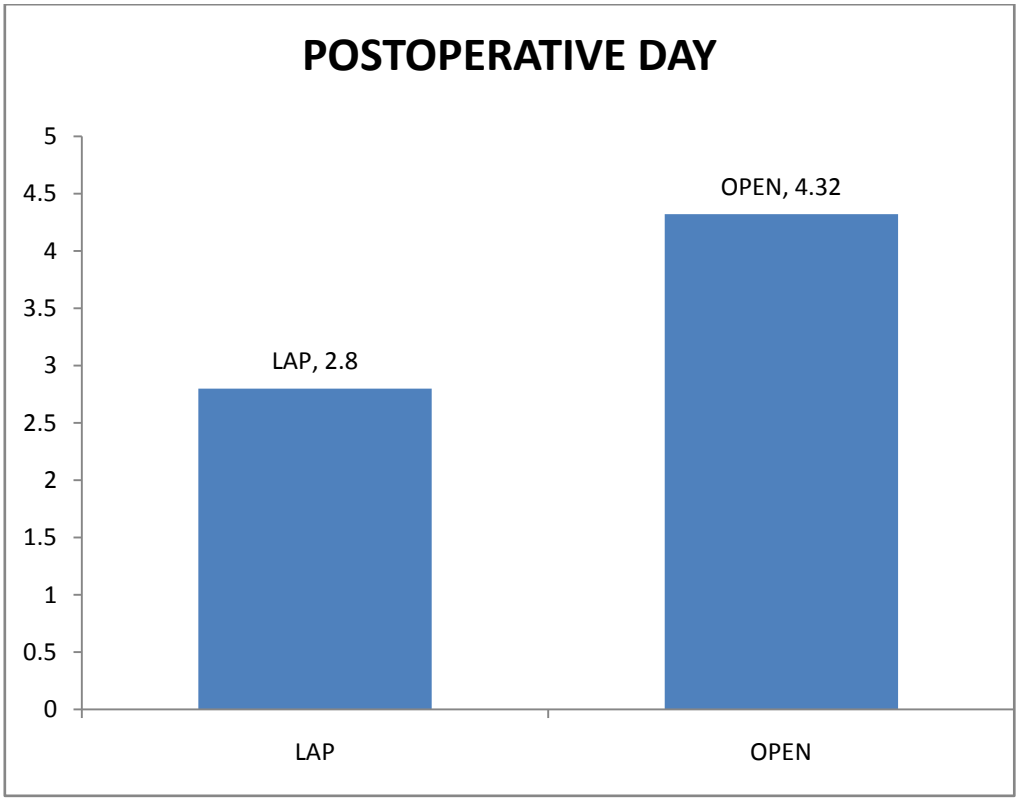
INTRA OP COMPLICATIONS

Complications	Open	Laparoscopy
Bowel injury	Nil	Nil
Bile duct injury	Nil	Nil
Bleeding	1	1
Others	Nil	Nil

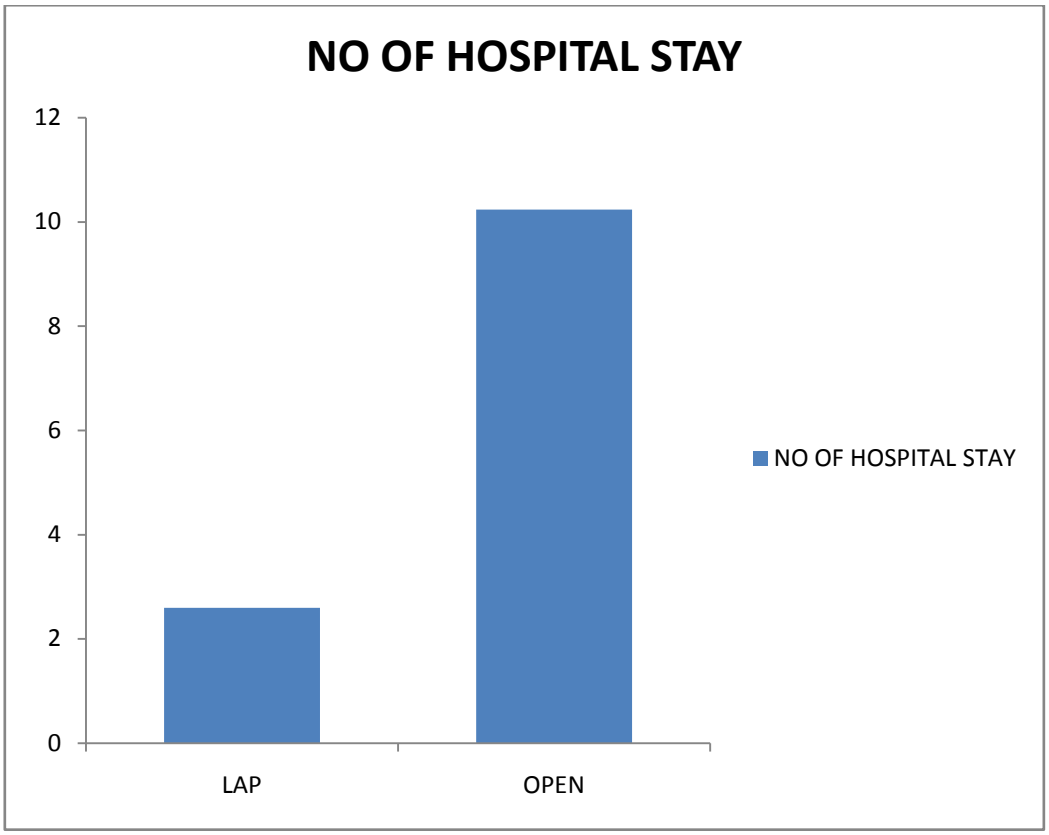
POST OP COMPLICATIONS

COMPLICATIONS	OPEN	LAPAROSCOPY
Bleeding	1	Nil
Wound infection	3	1
Jaundice	Nil	Nil
Bile leak via DT	Nil	Nil
Post cholecystectomy syndrome	1	Nil
Pulmonary complications	1	Nil
Others	Nil	Nil

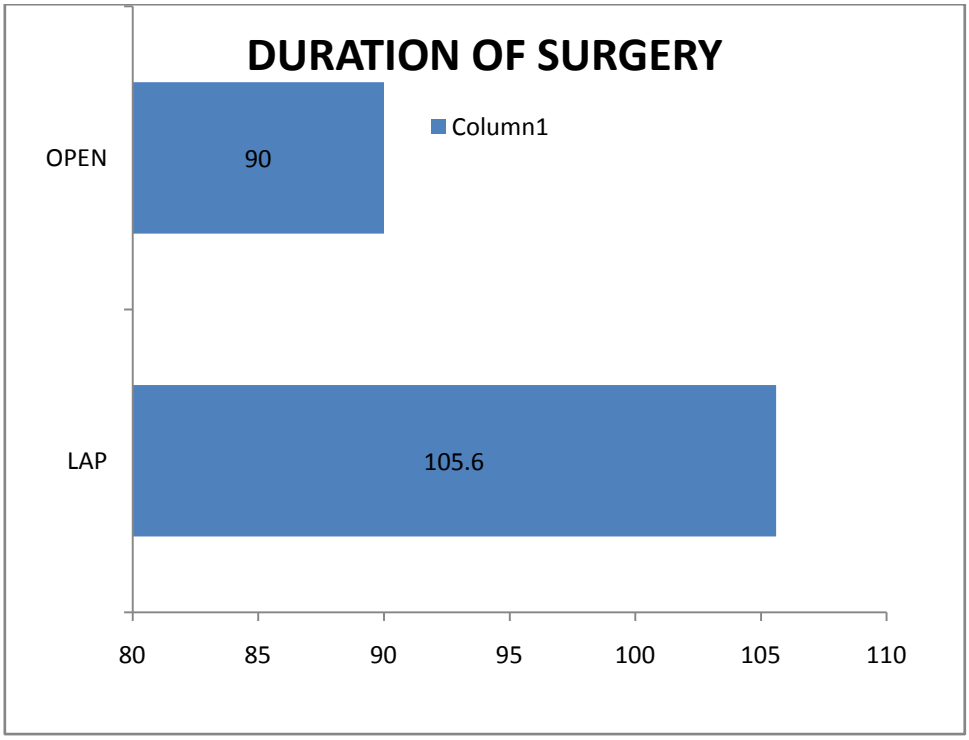
RESUMPTION OF NORMAL DIET



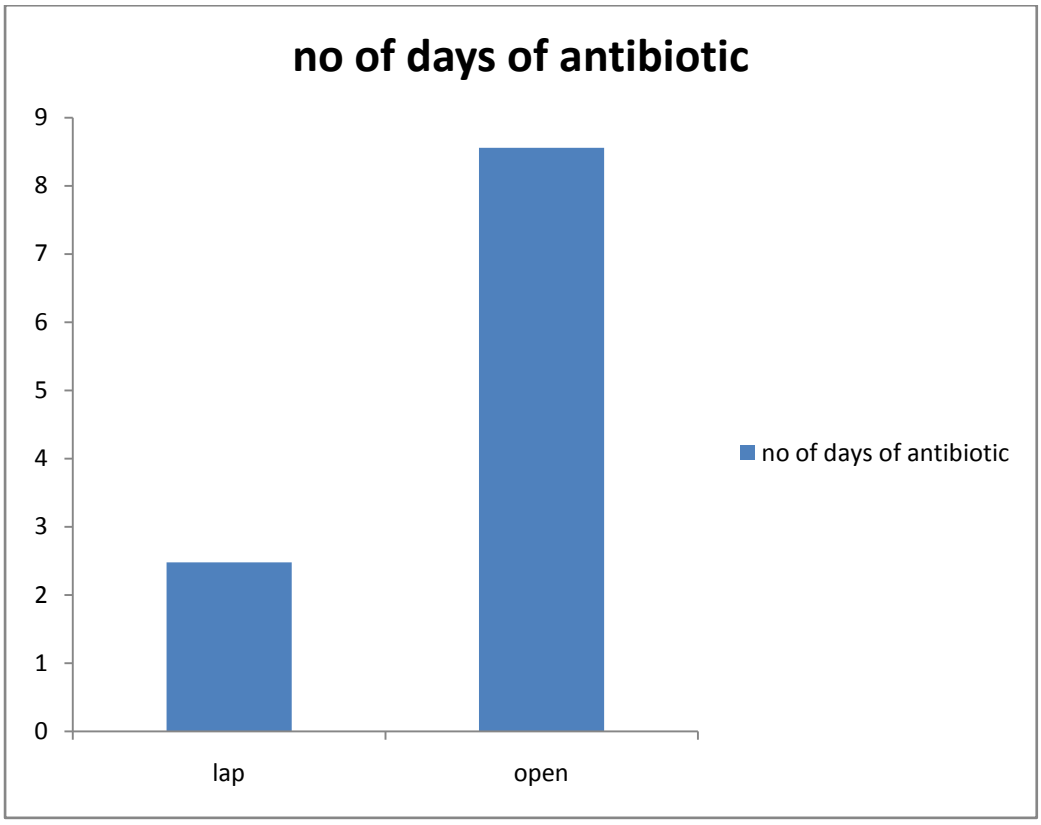
POST OPERATIVE HOSPITAL STAY



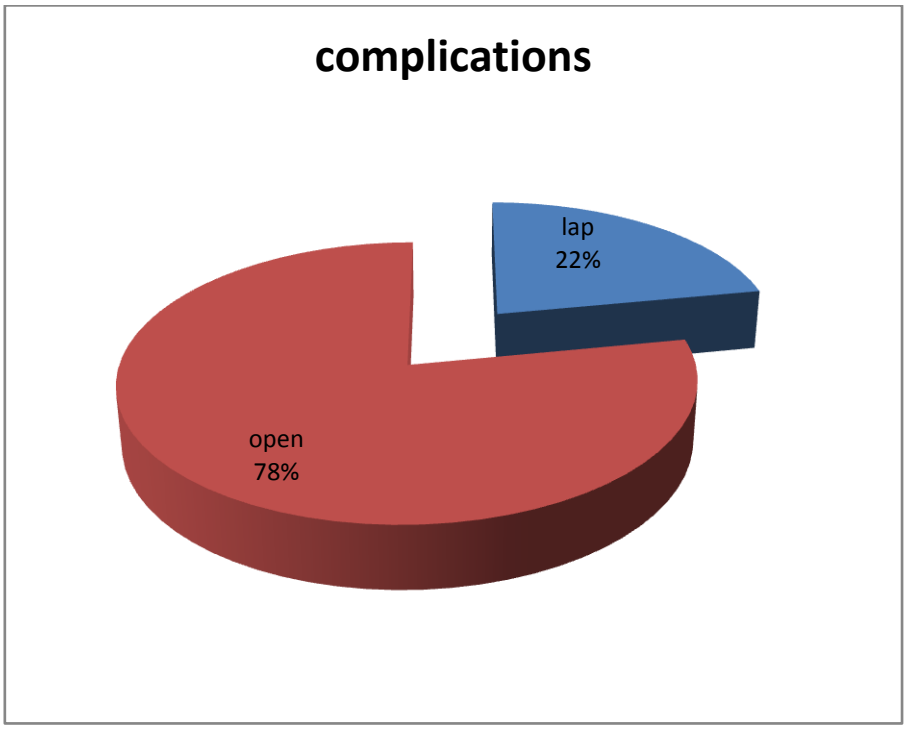
DURATION OF SURGERY

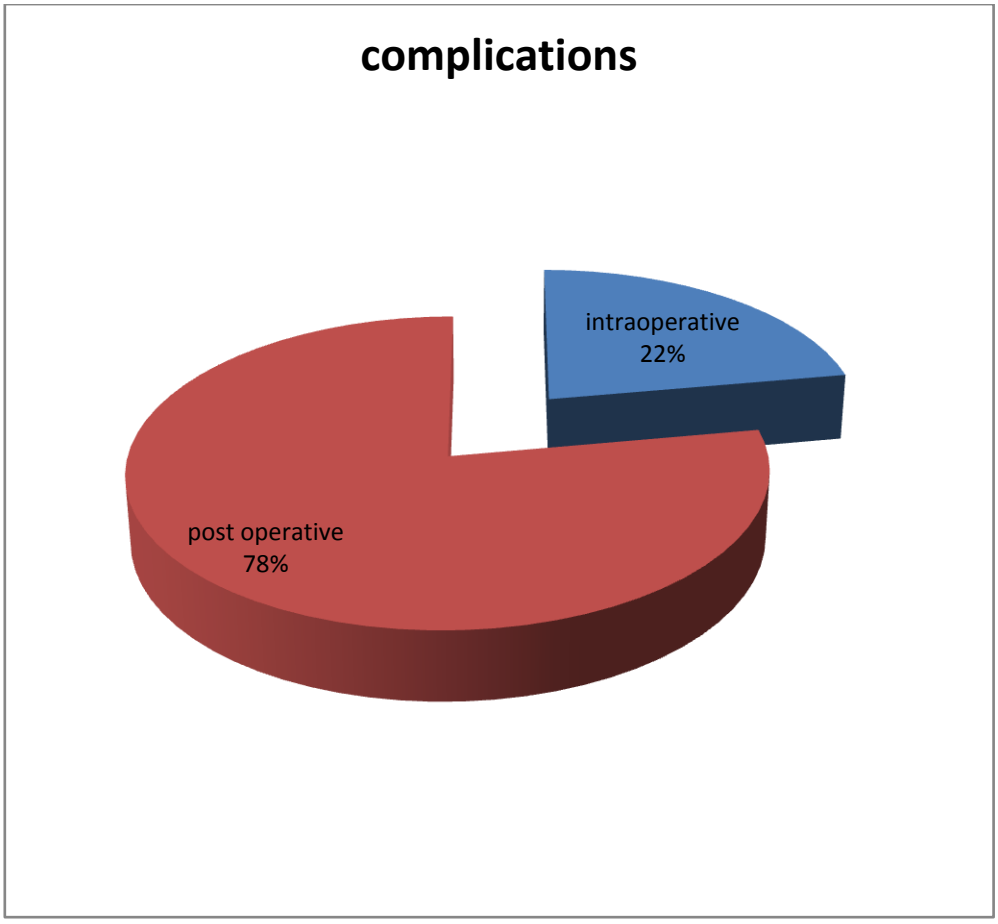


ANTIBIOTIC REQUIREMENT



COMPLICATIONS





Among the complications occurred in our study about 22% occurred intra operatively and 78% occurred post operatively.

STATISTICAL ANALYSIS

The datas in this study is reported as the mean+/- SD or the median depending on their distribution. The chi square test was used to assess differences in categoric variables between groups. P value less than 0.05 is considered as significant. All statistical analysis were performed with the help of a statistician.

INTRA OPERATIVE COMPLICATIONS

COMPLICATIONS	**OPEN (n=25)**	**%**	**LAP (n=25)**	**%**
Bile duct injury	0	0	0	0
Bowel injury	0	0	0	0
Bleeding	1	4	1	4
Others	0	0	0	0
Total	1	4	1	4

POST OPERATIVE COMPLICATIONS

COMPLICATIONS	OPEN	(%)	Lap	(%)
Bleeding	1	4	0	0
Wound infection	3	12	1	4
Jaundice	0	0	0	0
Bile leak	0	0	0	0
Post cholecystectomy syndrome	1	4	0	0
Pulmonary complications	1	4	0	0
Total	6	24%	1	4%

Complications	Open	Laparoscopic	Total
Intra operative	1	1	2
Post- operative	6	1	7
Total	7	2	9

CHI SQUARE TEST

Procedure	No of complication	No of cases not complicated	Total
Laparoscopy	2	23	25
Open	7	18	25
Total	9	41	50

Chi square value = 3.388

P value = 0.0398

DETAILS OF PATIENT SUBJECTED TO OPEN AND LAPAROSCOPIC CHOLECYSTECTOMY

Variables	Laparoscopy	Open
Age in yrs	40+/-11.8	41.16+/-13.0
Sex ratio(M:F)	12/13	13/12
Duration of surgery	105.6+/-11.24	90+/-15.81
Antibiotic requirement	2.48+/-0.71	8.56+/-1.19
Analgesic requirement	3.16+/-0.37	6.52+/- 0.85
Resumption of normal diet	2.84+/-0.62	4.32+/-0.85
Complications	4%	14%
Post operative stay	2.6+/-0.57	10.18+/-0.96

DISCUSSION [17,18]

In my study I have selected patients for operative procedure depends on history, clinical examination, liver function test and ultrasonography. The patients with CBD stones are excluded from my study by imaging method and LFT.

This is a study of 25 cases of laparoscopic cholecystectomy of which 12 are male and 13 are female patients, compared with 25 cases of open cholecystectomy of which 12 male patients and 13 are female patients.

This study revealed the following

- Visualisation and magnification of the anatomy of the callots triangle is much better in laparoscopy when compared to the open method.
- The mean duration for laparoscopic procedure is 105.6 and for open is 90 minutes which is 15.6 minutes longer than that of the open cholecystectomy.
- Regarding the requirement of analgesia open cholecystectomy patient requires analgesics even on the 7 the POD, where as in case of laparoscopic cholecystectomy analgesia is needed for only 3 days or less than that.

Open cholecystectomy induces an inflammatory response in which pro inflammatory cytokines such as IL6, IL8, IL 1B, TNF alpha and C reactive proteins are released which is responsible for increased pain and late recovery. There is also suppression of cell mediated immune system transiently which alters the functioning of lymphocyte, monocyte and other immune cells.[17]

In laparoscopic cholecystectomy trauma is less so release of pro inflammatory cytokines are also less and so post operative recovery is good and requirement of analgesia is also less.

- The duration of antibiotics needed for open cholecystectomy is around 8 days and for laparoscopic cholecystectomy is less than 3 days.
- Regarding the complications intra-operatively bleeding occurs in one case of open cholecystectomy and in one case of open cholecystectomy. No bile duct injury had occurred in both open and laparoscopic cholecystectomy.
- Regarding the complication post- operatively bleeding occurred in one case of open cholecystectomy and nil in case of laparoscopic cholecystectomy. Wound infection had occurred in both open and laparoscopic group. One case of open cholecystectomy had post cholecystectomy syndrome and one case of open cholecystectomy had pulmonary complications. No post cholecystectomy syndrome

or pulmonary complications are reported in the laparoscopic group. The complication rate for open surgery is 14% and laparoscopic cholecystectomy is only 4%.

- The duration of stay in hospital post operatively is about 10 days for open cholecystectomy and for laparoscopic cholecystectomy is 2.6 days. So it is cost effective than open cholecystectomy.
- Scar is minimal after laparoscopic surgery. So cosmetically it offers greater advantage than open cholecystectomy.

COMPARISION WITH OTHER STUDIES

1) IN OUR STUDY

Variables	Laparoscopy	Open
Age	40	41.16
Sex ratio	12/13	13/12
Duration of surgery	105.6	90
Analgesic requirement	2.48	8.56
Antibiotic requirement	3.16	6.52
Resumption of normal diet	2.84	4.32
Complications	4%	14%
Duration of hospital stay	2.6	10.18

Conversion rate:4%

2)VARIOUS STUDY ON LAP CHOLECYSTECTOMY:[19]

STUDY	NO. OF PTS	COMPLICATIONS (%)	MORTALITY (%)	RATE OF CONVERSION
Cuscheri et al(1991)	1236	1.6	0	3.6
Soper et al(1998)	1200	2.7	0.1	2.1
Fullarton et al(1994)	1683	5.9	0.5	17
Perisat t al (1992)	777	3.3	0	5.5
Southern surgeons club(1991)	1518	1.5	0.07	4.7
Cappuccino et al(1994)	563	6.9	0	4.8
Newman et al(1995)	1525	4.1	0.2	2.2

3)VARIOUS COMPARITIVE STUDY BETWEEN OPEN AND LAP CHOLECYSTECTOMY:[22]

Study	No. of pts	Duration of surgery(min)	Duration of hospital stay(day)	Complication(%)
MacMahonet al Open (minilap) lap	148 151	57 71	4 2	20 17
Trondsen et al(1993) Open lap	35 35	50 100	4 3	20 17
Barkun et al (1992) Open lap	25 37	73 86	4 3	8 2.7
Masjeed et al(1998) Open lap	100 100	40 65	3 3	- -

4)HELLIGSO ET AL .1994[21]

VARIABLES	LAPAROSCOPY
Operating time	110 min
Intra operative complications	0.9%
Post operative complications	7.1%
Conversion rate	2.8%
Hospital stay	3.5day
Time of recovery	12.5day

5) JOHANSSON ET AL(2005)[20]

Variables	Laparoscopy	Open
Age	53	56
Sex	19:16	16:19
Duration of surgery	90	80
Hospital stay	2	2
Conversion rate	23	-

CONCLUSION

In our study laparoscopic cholecystectomy succeeded the open procedure by the following

- Better visualisation and magnification of anatomy of Callots triangle.
- Reduced post operative morbidity.
- Shorter duration of requirement of analgesia.
- Shorter duration of requirement of antibiotics.
- Reduced wound infection.
- Early resumption of normal diet.
- Early ambulation and return to normal activity.
- Shorter post-operative stay in hospital.
- Best cosmetic effect.

The only disadvantage of laparoscopic procedure is increased time duration.

ANNEXURE

PROFORMA

1. NAME :

2. AGE/SEX :

3.HOSPITAL NO :

4. OCCUPATION :

5. DATE OF ADMISSION :

6. DATE OF SURGERY :

7. DATE OF DISCHARGE :

8. COMPLAINTS :

9. CLINICAL EXAMINATION :

10. INVESTIGATIONS :

11. DIAGNOSIS :

12. PROCEDURE (OPEN/LAP) :

13. OPERATIVE DETAILS :

A. Anaesthesia

B. Duration of surgery

C. Gas used

D. Number of ports used

E. Findings

F. Problems encountered

I. Spillage – bile, stones

II. Bleeding – cause, source, management

III. Bile duct injury

IV. Others

G. Drainage – used or not

H. Conversions – yes or no, reason

14. POST OPERATIVE PERIOD

A. Pain

B. Analgesic and antibiotics used– drugs, dosage, duration

C. Day of oral feeds

D. Day of drain removal

E. Day of ambulance

F. Day of return to normal diet

15. COMPLICATIONS :

16. HOSPITAL STAY :

17. CONDITION AT DISCHARGE :

18. FOLLOW UP

சுய ஒப்புதல் படிவம்

ஆய்வு செய்யப்படும் தலைப்பு

லாப்ரோஸ்கோப்பி முறையில் செய்யப்படும் பித்தப்பை அகற்றல் மற்றும் அறுவைசிகிச்சை முறையில் செய்யப்படும் பித்தப்பை அகற்றலை ஒப்பிடுதல்.

ஆராய்ச்சி நிலையம் : கி.அ.பே.விஸ்வநாதன் அரசு மருத்துகல்லூரி திருச்சி.

பங்கு பெறும் நோயாளியின் பெயர் : வயது :

பாலினம் : ஆண் ☐ பெண் ☐

பங்கு பெறும் நோயாளியின் எண் :

நோயாளியின் பெயர்/ விலாசம் :

நோயாளி இதனை ( ) குறிக்கவும் :

மேலே குறிப்பிட்டுள்ள மருத்துவ ஆய்வின் விவரங்கள் எனக்கு விளக்கப்பட்டது என்னுடைய சந்தேகங்களைக் கேட்கவும், அதற்கான தகுந்த விளக்கங்களை பெறவும் வாய்ப்பளிக்கப்பட்டது. ☐

என்னை இவ்வாய்வில் தன்னிச்சையாகத்தான் பங்கேற்கிறேன். எந்த காரணத்தினாலோ எந்த கட்டத்திலும் எந்த சட்ட சிக்கலுக்கும் உட்படாமல் என்னை இவ்வாய்வில் இருந்து விலக்கிக் கொள்ளலாம் என்றும் அறிந்து கொண்டேன். ☐

இந்த ஆய்வு சம்பந்தமாகவோ, இதை சார்ந்த மேலும் ஆய்வு மேற்கொள்ளும் போதும் இந்த ஆய்வில் பங்குபெறும் மருத்துவர் என்னுடைய மருத்துவ அறிக்கைகளை பார்ப்பதற்கு என் அனுமதி தேவையில்லை என அறிந்து கொள்கிறேன். நான் விலக்கிக் கொண்டாலும் இது பொருந்தும் என அறிகிறேன். ☐

இந்த ஆய்வின் மூலம் கிடைக்கும் தகவல்களையும், பரிசோதனை முடிவுகளையும் மற்றும் சிகிச்சை தொடர்பான தகவல்களையம் மருத்துவர் மேற்கொள்ளும் ஆய்வில் பயன்படுத்திக் கொள்ளவும் அதை பரிசோதிக்க என் முழு மனதுடன் சம்மதிக்கின்றேன். ☐

இந்த ஆய்வின என்னை ஈடுபத்த முழுமனதுடன் ஓப்புக் கொள்கிறேன். இந்த அறுவை சிகிச்சை மற்றும் அதனால் ஏற்படக் கூடிய பின் விளைவுகள் மற்றும் எதிர்பாராத விளைவுகள் பற்றி எனக்கு விளக்கமாகத் தெரிவிக்கப்பட்டது. ☐

என் நலன் கருதியே இந்த ஆய்வு மேற்கொள்ளப்பட்டது என்று தெரிந்து இந்த ஆய்விற்கு ஒப்பளிக்கின்றேன். ☐

நோயாளியின் கையொப்பம்.....இடம்.....தேதி .....

கட்டைவிரல்ரேகை(இந்த படிவம் படித்து காட்டப்பட்டு புரிந்து கைரேகை அளிக்கின்றேன்)

ஆய்வாளரின் கையொப்பம்.....இடம்.....தேதி.....

ஆய்வாளரின் பெயர்.....

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LAPAROSCOPIC CHOLECYSTECTOMY

S.NO	NAME	SEX	AGE	DURATION (MIN)	ANALGESIC REQ (DAYS)	ANTIBIOTIC REQ (DAYS)	RESUMPTION OF DIET	HOSPITAL STAY (DAYS)
1	SANGEETHA	F	22	120	3	3	3	4
2	VADIVEL	M	34	110	4	2	4	3
3	SIVA	M	45	100	3	2	3	3
4	DEEPA	F	32	100	3	2	2	2
5	MUTHUMARI	F	45	120	3	2	3	3
6	MANIKAM	M	63	110	3	3	3	2
7	KUPPUSAMY	M	55	100	3	2	2	3
8	MARIYAMMAL	F	46	110	3	2	3	2
9	VINCENT	M	57	100	3	3	3	2
10	RANI	F	43	120	4	2	4	3
11	JANANI	F	24	120	3	2	3	3
12	BRINDHA	F	23	100	3	2	2	3
13	KASTHURI	F	43	110	3	4	3	2
14	SETHURAMAN	M	32	100	3	3	4	3
15	MUTHARASAN	M	43	120	4	2	3	3
16	KALIAPPAN	M	36	130	3	2	2	3
17	KATHAVARAYAN	M	56	100	3	2	3	2
18	MALIGA	F	45	90	3	2	3	2
19	HEMA	F	57	100	3	2	2	2
20	MARUTHAI	M	36	110	3	3	3	2
21	FATHIMA	F	29	90	4	2	3	2
22	SATHYANATHAN	M	38	100	3	4	2	3
23	CHANDRASEKAR	M	45	90	3	3	3	3
24	RAJATHI	F	27	100	3	2	2	3
25	GAYATHRI	F	24	90	3	4	3	2
	AVERAGE		40	105.6	3.16	2.48	2.84	2.6
	SD		11.84	105.6	0.37	0.71	0.62	0.57

OPEN CHOLECYSTECTOMY

S.NO	NAME	AGE	SEX	DURATION IN MIN	ANALGESIC REQ	ANTIBIOTIC REQ	RESUMPTION OF DIET	HOSPITAL STAY(DAYS)
1	ramraj	45	M	100	7	7	3	10
2	maruthammal	69	F	90	6	8	5	11
3	manjula	21	M	120	8	6	4	9
4	ramassamy	32	M	130	7	9	5	10
5	sivasubramanian	47	M	90	6	10	4	11
6	slvaraman	43	M	90	8	7	5	12
7	selvi	28	F	100	6	9	5	9
8	nirmala	37	F	80	7	8	5	10
9	saraswathy	42	F	90	6	10	4	12
10	prasad	19	M	70	6	9	3	11
11	pandy	55	M	80	7	10	5	10
12	vellayammal	46	F	90	7	8	4	9
13	jeya	58	F	80	6	9	6	10
14	eswari	34	F	90	6	7	3	9
15	maniselvi	26	F	100	6	10	4	10
16	karrupan	39	M	70	7	8	5	10
17	muthusamy	53	M	80	7	10	5	11
18	mariappan	62	M	70	7	9	4	10
19	kannammal	44	F	90	6	8	5	11
20	rajalingam	36	M	100	7	10	4	12
21	marappan	53	M	70	6	7	3	10
22	rathinam	41	F	90	6	9	5	9
23	sengodi	44	F	120	6	8	4	11
24	giritharan	36	M	80	6	10	3	10
25	kanagi	19	F	80	6	8	5	9
	average	41.16		90	6.52	8.56	4.32	10.24
	standard deviation	13		15.8	0.65	1.19	0.85	0.96